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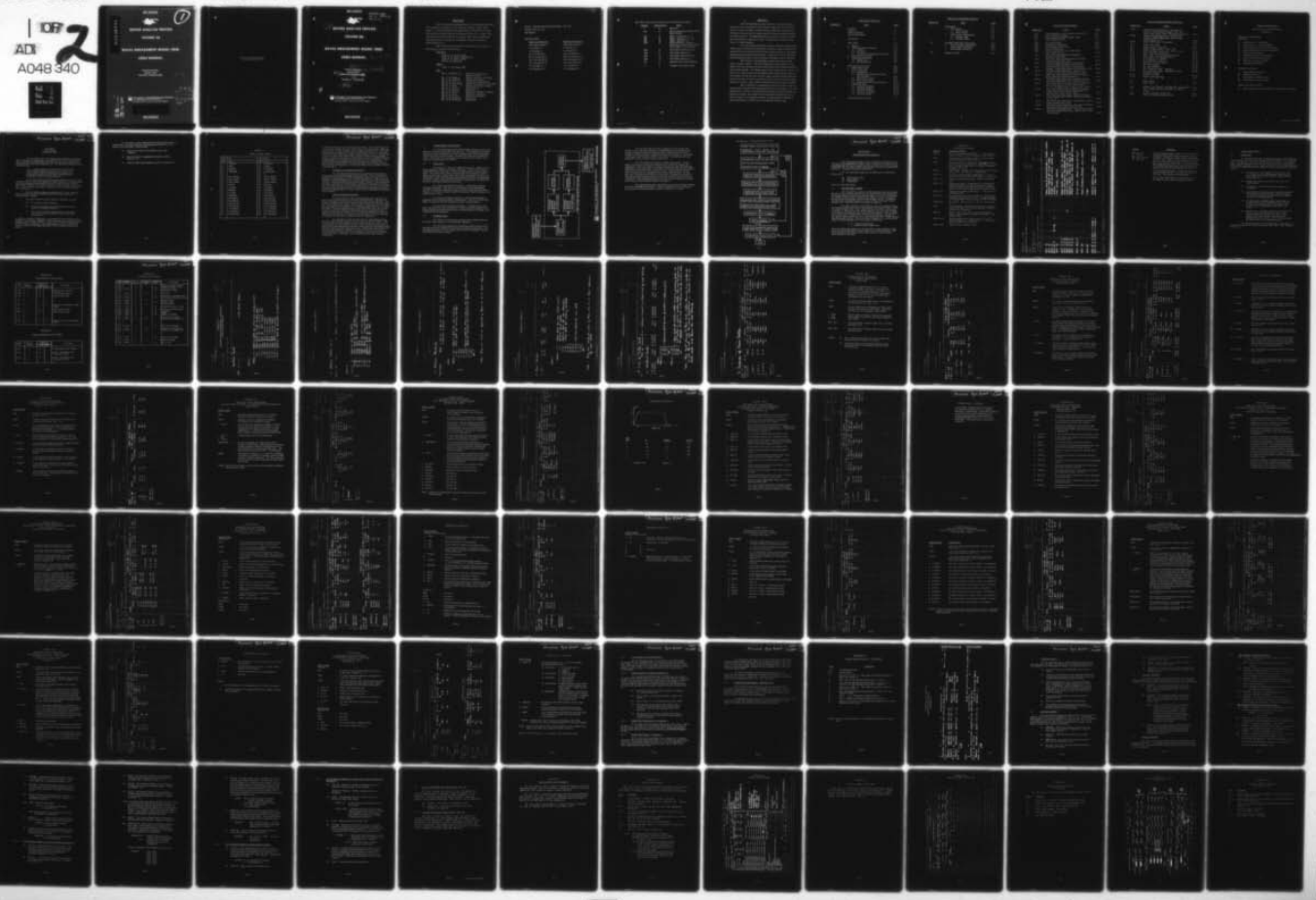

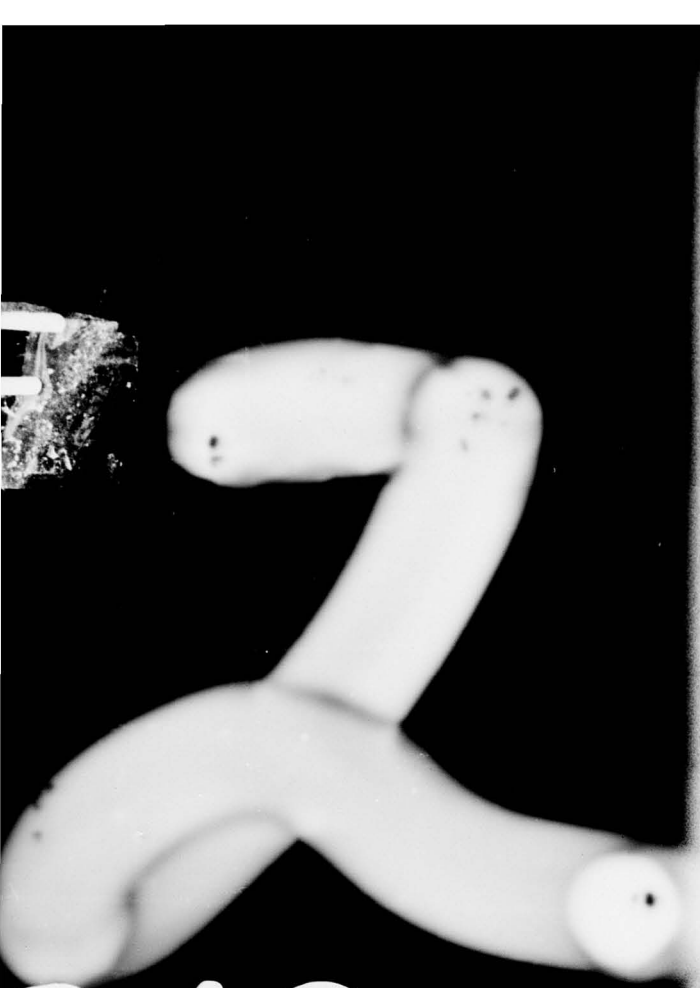

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SEATIDE ANALYSIS PROCESS.

VOLUME IIA.

NAVAL ENGAGEMENT MODEL (NEM)

USERS MANUAL. Revision A.

(14) VSD-

REPORT NO. 00.1636 – VOL-2A-REV-A

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VOUGHT SYSTEMS DIVISION
LTV AEROSPACE CORPORATION
P.O. BOX 5907 · DALLAS, TEXAS 75222

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FOREWORD

(U) This report was prepared by the Vought Systems Division, LTV Aerospace Corporation, P.O. Box 6267, Dallas, Texas 75222 under U. S. Army Electronics Command Contract DAAB09-72-C-0062. The work was initiated under the direction of Captain R. A. Dowd, USN and completed under Captain W. A. Greene, USN, Chief, Long Range Forecast Division, Directorate of Estimates, Defense Intelligence Agency (DIA-DE-1).

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Mr. L. D. Cardwell	Propulsion

22 Oct 76
RRB

TITLE: SEATIDE ANALYSIS PROCESS - VOL. IIA

REPORT NO. 00.1636

REVISION A

INSTRUCTIONS:

Pages to be removed:	Pages to be inserted:
Title page through ii	Title page through ii
iii through viii	iii through viii
I-1 through I-2	I-1 through I-2
III-3 through III-4	III-3 through III-4
III-65 through III-66	III-65 through III-66
III-71 through III-75	III-71 through III-77
IV-23 through IV-42	IV-23 through IV-42
V-3 through V-8	V-3 through V-8
VI-1 through VI-7	VI-1 through VI-7

(U) This report has been prepared in the following volumes:

Volume	Classification	Title
I	S	Summary
IIA	U	Naval Engagement Model (NEM) - Users Manual
IIB	U	NEM - Appendices A - I
IIC	S	NEM - Appendices J - M
IID	U	NEM - Appendix N
IIIA	U	Cruise Missile - Concept Generation and Screening Model (CM-CGSM) - Users Manual
IIIB	U	CM-CGSM Appendices A-B
IIIC	S	CM-CGSM Appendix C
IIID	U	CM-CGSM Appendices D-G
IIIE	U	CM-CGSM Appendix H
IV	S	Relative Worth Model (RWM)
V	U	Relative Cost Model (RCM)

ABSTRACT

(U) The SEATIDE Analysis Process is a semi-automated procedure for the generation of time-phased, high value cruise missile weapon systems concepts, together with the supporting technology and intelligence indicators which would reflect that these technological goals are being achieved. The SEATIDE process can also be used to evaluate the effectiveness of fixed force levels, existing forces in SAL environments, or Naval defenses.

(U) The Defense Intelligence Agency, through its Directorate of Estimates, and The Advanced Research Projects Agency (ARPA) have sponsored the development of this computer based analysis at the weapon system and Naval force structure level. A previous process, RIPTIDE, was developed for DIA for use in analysis of strategic missile systems.

(U) Generic to the SEATIDE Analysis Process are three major computer models: The Naval Engagement Model (NEM), Cruise Missile Concept Generation and Screening Model (CM-CGSM) and Relative Worth Model (RWM). The NEM evaluates force effectiveness, tactics, and task force configurations; the CM-CGSM enables definition and selection of candidate, advanced cruise missile system concepts; and the RWM permits assessment of worth in accordance with a variety of objective and subjective criteria. Each of these models has been checked out by DIA.

(U) In addition to exercising the computer models, there are several other analytical and engineering tasks to be performed, e.g., the identification of areas of current interest and the associated criteria and potential concepts, the creation of a foreign technology data bank in a format needed by the computer models, the engineering of concepts to the required detail, and the use of a verification analysis loop.

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Naval Engagement Model (NEM)

Appendices

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SECTION I
INTRODUCTION

(U) On 28 June 1972, the Vought Systems Division, a division of LTV Aerospace Corporation, contracted with the Defense Intelligence Agency (DIA) to develop the SEATIDE Analysis Process in support of the DIA Long Range Forecast Division (DE-1). The SEATIDE Analysis Process is defined to be:

> " .... a semi-automated procedure for the generation of time phased, high value naval cruise missile concepts, together with the supporting technology and the intelligence indicators which would reflect that these technological goals are being achieved .... "

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(U) The NEM is written in FORTRAN IV computer language and is compatible with the DIAMS IBM/360-65 computer system at Arlington Hall, Virginia.

(U) This manual is written with three objectives in mind:

(a) To serve the systems analyst.

(b) To serve the programmer who will implement and update the computer programs.

(c) To serve the computer operations personnel with a source for preparing detailed computer operating instructions.

In addition, a number of appendices are included to give a broader understanding of the purpose, approach, and/or techniques used in various major portions of the computer models. Volume IID is a detailed listing of the FORTRAN Source Program. Other information, of interest only to the systems analyst or technology specialist, is to be found in Volumes IIB and IIC.

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(U) Revision A to this volume includes those improvements to NEM made in conjunction with the development and addition of a cost model to the CM-CGSM. These include:

(a) Improved sea clutter calculations in the radar submodel.

(b) Improved range of engagement parameter options (Section 3.3).

(c) Improved table update options on File 11 (Section 2.5).

FIGURE II-2

INDEX TO SYSTEMS CATALOG

BLU CATALOG		RED CATALOG	
CODE	ITEM	CODE	ITEM
60.	RESERVED	80.	RESERVED
61.	SHIPS	81.	SHIPS
62.	AIRCRAFT	82.	AIRCRAFT
63.	SUBMARINES	83.	SUBMARINES
64.		84.	
65.	ACT. SENSORS	85.	ACT. SENSORS
66.	PASS. SENSRS	86.	PASS. SENSRS
67.	FIRE CONTROL	87.	FIRE CONTROL
68.	CM/CCM	88.	CM/CCM
69.	CCC,NTDS	89.	CCC,NTDS
70.	RESERVED	90.	RESERVED
71.	S-S GUNS	91.	S-S GUNS
72.	TORPEDOES	92.	TORPEDOES
73.	ASW WEAPONS	93.	ASW WEAPONS
74.	ASW ROCKETS	94.	ASW ROCKETS
75.	ANTI-AIR GUN	95.	ANTI-AIR GUN
76.	S-S MISSILES	96.	S-S MISSILES
77.	S-A MISSILES	97.	S-A MISSILES
78.	A-S MISSILES	98.	A-S MISSILES
79.	AA MISS,GUNS	99.	AA MISS,GUNS

Y=400 NM, heading west at 20 knots. BLU Groups 1 and 2 contain aircraft carriers and escorts. The other BLU Groups are various AEW, ASW, and CAP stations. In this example, all are within a 150 NM circle. The RED Groups in this example are all outside the 150 NM circle at T=0 except for two Charlie class submarines shown as RED Groups 1 and 13. RED Groups 3 and 11 are Echo class submarines, attended by Bear aircraft in RED Groups 15 and 18, respectively. RED Groups 6 and 8 are KRESTA/KYNDA groups attended by aircraft in RED Groups 16 and 17, respectively. Additional details on this disposition and the technique for developing and specifying the planned routes into this disposition, and the planned routes out, are given in Appendix A. Formats for inputs to the computer are given in Section III.2.

2.3 Variations in Engagement Structure

(U) The Engagement Structure is completely determined by three classes of tables (as defined in Section III.2). First, Table 0001 is essentially a list of BLU and RED Group tables which are to be used, i.e., whether or not that group is in or out of the engagement. Tables 0100 and 0200 give for BLU and RED sides, respectively, the movement of the group centers. Table 0101 through 0115 give the type, quantity, and formation of the Units in each of the 15 BLU groups, and Tables 0201 through 0218 give the same information on each of the 18 RED groups. Any line in these tables may be removed or altered either permanently or temporarily by methods described in Section III.2.5. Thus, a great variety of engagement situations can be studied.

3. NAVAL SYSTEMS CATALOG

(U) Each unit in the BLU and RED groups discussed above is given a type number which is a two level indentured code. Likewise, all sensors, weapons, and systems are given two level indentured codes. The top level of these codes for both BLU and RED systems are shown in Figure II-2, Index to Systems Catalog. For example, all BLU ships have 61 as the first two digits in a four digit code, and all RED ships have 81 as the first two digits. The third digit determines what kind of ship (aircraft carrier, cruiser, destroyer), and the fourth digit determines specifically which ship (Forrestal, Kynda, Kresta, etc.). Similar breakdowns are made for submarines and aircraft. A detailed index and ground rules for using and revising the Naval Systems Catalog are given in Appendix B.

(U) A point to be noted is that each so-called platform (ship, aircraft, submarine) has on it one or more sensors and/or weapons. The characteristics of these platforms (size, maximum velocity, etc.), a list of specific sensors and weapons (by type code), and the characteristics of these sensors and weapons are given in a series of tables with table numbers directly related to the four digit type codes. Collectively, these tables are called the Naval Systems Catalog, are punched on 80 column cards in a format defined in Section III.2, and in addition are stored in the computer on magnetic disk. Instructions for revising this data is given also in Section III.2.

4. ENGAGEMENT SIMULATION

(U) The Naval Engagement Model (NEM) simulates a two-sided (RED versus BLU) engagement in the open sea. The engagement structure and naval systems previously discussed, together with certain engagement control variables discussed below, determine the interaction and the outcome. All of these can be changed by User input and thus permit a wide variety of combinations to be studied.

4.1 Model Flow

(U) Figure II-3 shows the NEM top level flow. NEM is a partially randomized (Monte Carlo) type simulation. Prior to the first pass through the Monte Carlo loop, a setup of engagement and system details is made. This is done with a ZIP-8 control card, see Section III.1 below. This takes the data in Tables 0001, 0100, 0101 through 0115 for BLU, and Tables 0001, 0200, 0201 through 0218 for RED and "builds" an engagement structure, pulling in from the Naval Systems Catalog those systems asked for by the particular engagement structure.

(U) During each Monte Carlo pass, a time phased weapon exchange takes place. This includes at each time step an updating of movement, detection, allocation, weapon delivery, intercept, and target damage. A mixture of random number and expected value techniques, described below, is used.

(U) After each Monte Carlo pass, certain randomization is performed on the relative position of Naval Units. This is to reflect such things as imperfect tactical information and/or communications.

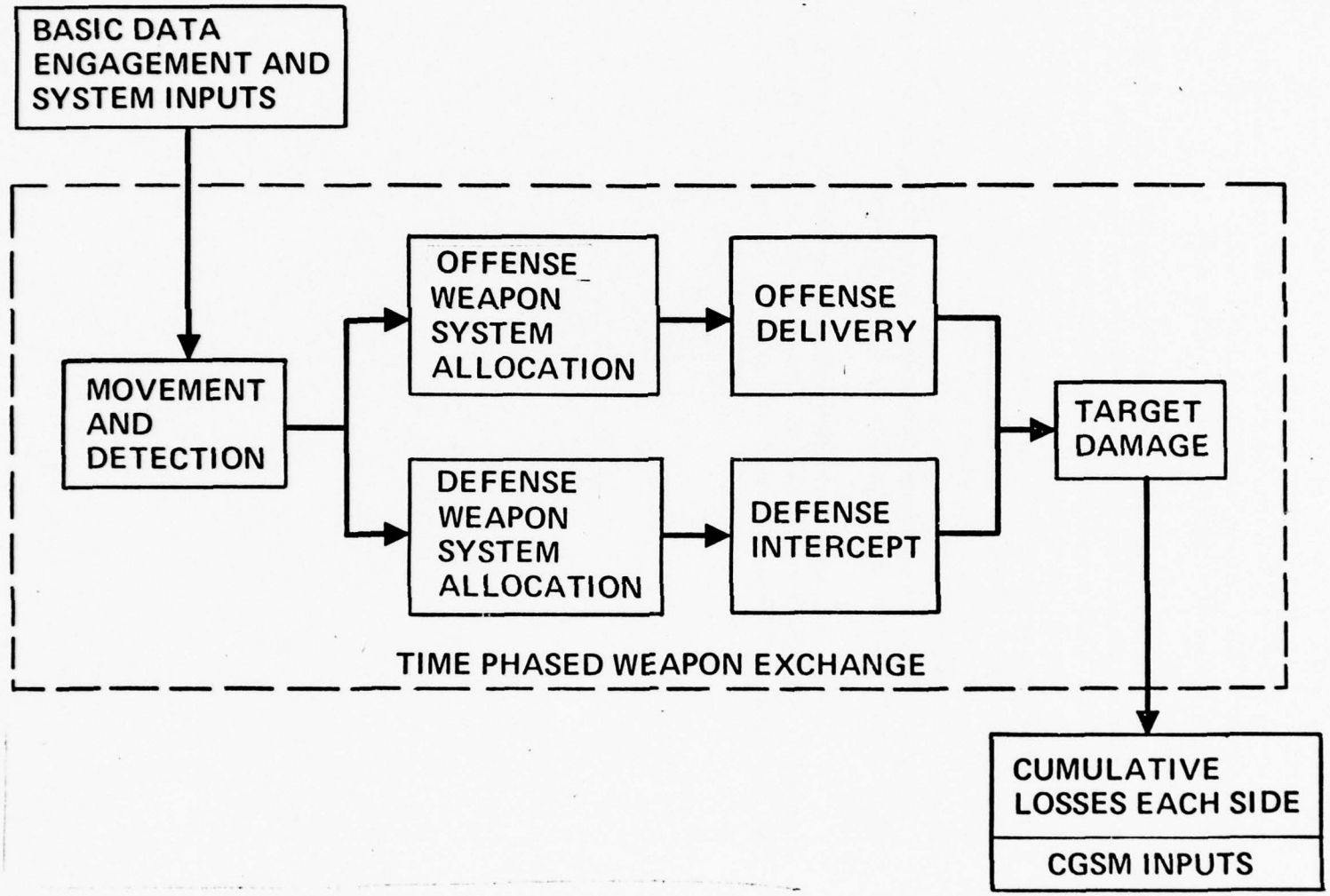
(U) After the last Monte Carlo pass, cumulative losses and other summaries are made and printed. These are used as inputs to the Cruise Missile Concept Generation and Screening Model (CM-CGSM). See Volume III and its appendices.

4.2 Simulation Flow

(U) Figure II-4 shows more details on the simulation flow of the NEM. Other details are in Volume IIB, Appendix I.

(U) The NEM simulates the interaction between units of BLU and RED forces for a period of up to twenty-one hours of real time. It is anticipated that best use of the model for so-called "coordinated" attacks will involve less than two hours.

FIGURE II-3. NAVAL ENGAGEMENT MODEL (NEM) - FLOW

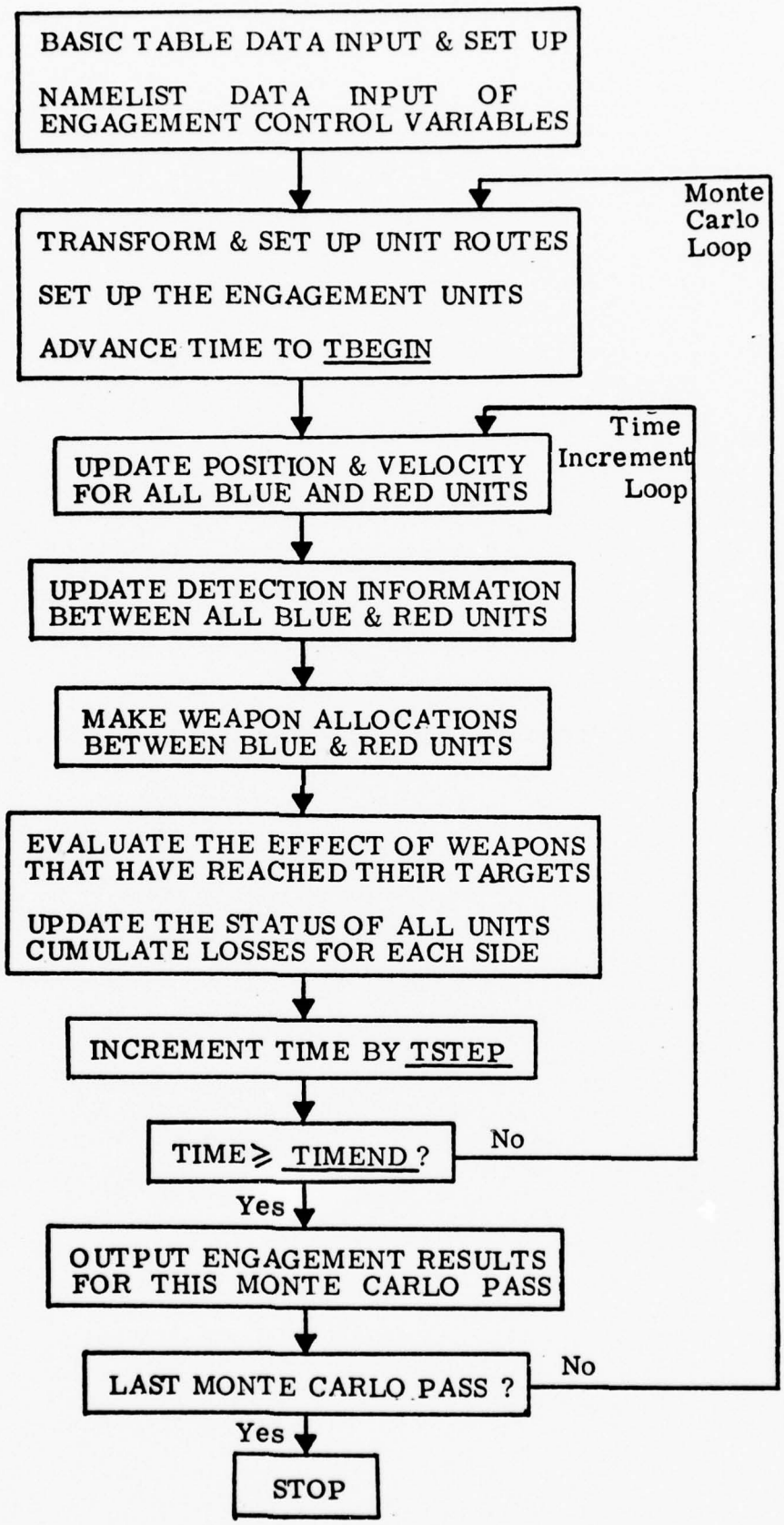


(U) The force for each side is defined by a set of ship, submarine and aircraft units deployed on and following routes predetermined by input. Interaction between opposing units is limited only by the constraints of relative position, velocity and subsystem capability. The model is symmetric with respect to RED or BLU units. The same ground rules govern the action of similar units on either side.

(U) The routine is primarily a Monte Carlo model. Several Monte Carlo passes through the simulation are executed to evaluate the engagement. Each pass differs in relative unit position with corresponding differences in unit interaction. Each Monte Carlo pass simulates the engagement over the period of time specified by input. Throughout this period, time is advanced by the integration step size specified by input. At each time step, the position and velocity of each unit is computed; all aspects of possible interaction between units are assessed; and the status of each unit is updated. Final engagement outcome is taken to be the arithmetic average of the results of the individual Monte Carlo passes.

(U) Engagement control variables are input to the routine through Namelists &DIMENS and &NGAGE. Specific definition of the variables and the mechanics of Namelist input are given in Section III. 3, below.

FIGURE II-4. NEM SIMULATION FLOW



SECTION III

NEM INPUTS AND FORMATS

(U) The purpose of this section is to define the inputs and formats to the Naval Engagement Model. Also, instructions are given on how to maintain and update a permanent data file on direct access disk storage, FORTRAN File 11. Other computer instructions and files are discussed in Section VI - Computer Operations Procedures.

(U) For discussion purposes, the NEM input is divided into three parts:

(a) ZIP Control Cards
(b) Basic Tables
(c) NAMELIST

These are discussed below.

1. ZIP CONTROL CARDS

(U) The first two cards in a NEM data deck are read as labels. The first card is usually used for security classification and is printed at the top and bottom of each formal page of output. The second card (called the PCODE card) is usually used to label a specific run and is printed at the top of each formal page, together with the page number. In addition, if at least one non-blank character is put in Columns 2 through 5 of the PCODE card, a list of all input card images is obtained.

(U) After these two cards have been read, all reading of data, file handling, and/or execution is controlled by ZIP Control Cards. These are shown in Figure III-1. They consist of the word ZIP in card columns 1 through 3, a series of numeric fields ending in column 40, and an alphameric field for descriptive text in columns 41 through 80. They are listed in numerical order in Figure III-1 for reference purposes. In general they appear (when used) in the same order in the data deck, but this depends upon the function desired. Where the letter P appears in a numeric field, replace it with an integer (0 or 1) for print level desired:

P = 0, no intermediate print
= 1, minimum intermediate print

Where the letters ID1 appear in a numeric field, replace with the 8-digit version of the Table Number (four trailing zeroes, right adjusted). And, where the letters ID2 appear, replace with minus the extent number, right adjusted as indicated.

FIGURE III-1

ZIP CONTROL CARDS

ZIP No.	Definition and Use
ZIP-1	Read new classification &PCODE. This could be used to introduce each variation run in the same job.
ZIP-2	Repeat print of title page. Could be used as above except no change in PCODE card.
ZIP-3	Start new data file - erase old. This must be used the first time data is loaded on a NEW File 11, or any time a complete replacement of old data is intended. Do not use otherwise.
ZIP-6	Call UCHEK, RADCK. Use after ZIP-8 to run special data checks. See Section V - Applications.
ZIP-7-1-1	Read basic table and add to DISK File 11. Use in front of each basic table when building a new data file.
ZIP-7-1-2	Find and print following table. Follow with TITLE card.
ZIP-7-1-4	Update basic table. Temporary if -1 in column 30. Supply (a) TITLE card, (b) column header card(s), (c) row card(s) to be inserted or added, and (d) two constant cards whether data on them changes or not.
ZIP-7-1-5	Replace basic table on DISK File 11. Use in front of a complete table.
ZIP-7-1-6	Print all basic tables now on DISK 11. Includes any temporary tables not yet erased. (Temporary tables are automatically erased as a part of ZIP-10 STOP.)
ZIP-8-0-P	Set up data. Print Level = P = (0, 1). Recommend P = 1.
ZIP-9	Read &DIMENS, &NGAGE; call XECUTE. Distribute dynamic storage, sets various engagement options, and executes simulation.
ZIP-10	STOP. Use as last card. Erases all temporary tables, prints number of tables left on DISK 11, and ends the JØB.
ZIP-11-1-P	Update original table, Print Level = P = (1, 2) See Section III.2.5. Recommend P = 2. Use before ZIP-8 and ZIP-9 to be effective.
ZIP-11-2-P	Updates latest temporary table.

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80 COLUMN CODING AND DATA FORM D-43797

PROGRAM

ROUTINE

NAME

UNIT

DATE

EXT.

PAGE OF

FIGURE III-1 (CONT'D.)

TYPE	STATEMENT NO.	CONT.	FORTRAN STATEMENT					FORTRAN	IDENTIFICATION
LOCATION		CONT.	OPERATION		ADDRESS, TAG, DECREMENT			MAP	
PAGE	SERIAL		A	B				COBOL	
ZIP	1							READ NEW CLASSIFICATION & PCODE CARDS	
ZIP	2							REPEAT PRINT OF TITLE PAGE	
ZIP	3							START NEW DATA FILE. ERASE OLD.	
ZIP	12		A		B→B		C	STRING	
ZIP	6							CALL UCHEK, RADCHK	
ZIP	7	1	1					READ BASIC TABLE & ADD TO DISK FILE 11	
ZIP	7	1	2					FIND AND PRINT FOLLOWING TABLE	
ZIP	7	1	4				-1	UPDATE BASIC TABLE. TEMP IF -1 IN COL. 3(	
ZIP	7	1	5					REPLACE BASIC TABLE ON DISK 11	
ZIP	7	1	6					PRINT ALL BASIC TABLES NOW ON DISK 11	
ZIP	8	0	P					SETUP DATA. PRINT LEVEL=P=(0,1)	
ZIP	9							READ &DIMENS, &NGAGE, CALL XECUTE	
ZIP	10							STOP.	
ZIP	11	1	P	ID1→		ID2→		UPDATE ORIGINAL TABLE, PRINT LEVEL=P	
ZIP	11	2	P	ID1→		ID2→		UPDATE TABLE UPDATE , PRINT LEVEL=P	

PAGE	LINE	LABEL	OPERATION	OPERAND	AUTOCODER	IDENTIFICATION

ZIP No.	Definition
ZIP-12-A-0 (A - Col. 8) (B - Cols. 16-20) (C - Col. 25)	Process String of Data on Tape 8. If A=1, read the following cards down through a card with XXX in columns 1-3 and store on Tape 8 under string number = B. If C = blank or zero, add at end of Tape 8, but if C=1 start at front of Tape 8. The first card in a string must be a ZIP card. The card preceding XXX must be the appropriate card to terminate the string so that the next card should be a ZIP card. If A=2, find string number = B and insert here for use in the input stream. The next card must be a ZIP card. The string will not be printed. If A=3, find string number = B and print only. If B = blank or zero, print all strings on Tape 8.

2. BASIC TABLE INPUT

2.1 Introduction

(U) The objective of this section is to describe a data input format commonly used in the Naval Engagement Model (NEM). It is called the Basic Table format. The format is discussed in six parts in the following pages, showing positions to be used on 80-column sheets as prepared for keypunching of input data cards. Application of this format to specific input tables is described later on in the report. Features of the Basic Table format are:

(a) The tables are "self-loading" in that the first card is a control card that identifies and routes the table to its proper home in the computer system (Direct Access File 11).

(b) Tables have unique table numbers as well as descriptive titles.

(c) Provision is made for both column headings and row labels.

(d) Up to four Real and four Integer constants associated with the table, but not properly a part of the table, are entered with their own labels below the table in a manner resembling footnotes.

(e) For parametric variations within a given run, or for file maintenance and updating (in case Disk 11 is set up as a permanent file), provision is made for row by row replacement of data and/or row labels.

(f) At time of use, the Basic Tables are retrieved from File 11 using two identification numbers, 'ID1' usually denotes type of table, and 'ID2' usually denotes the 'extent' number where a table is extended beyond 12 columns. For the current NEM the 'ID1' is set up as an indentured code.

(U) Identification codes and the NEM Basic Table Index are discussed in Section 2.2, and the six parts of the Basic Table format in Section 2.3.

2.2 Identification Codes and the NEM Data Set Index

(U) Two identification codes, ID1 and ID2, are associated with each Basic Table. It is entered on the Table Title Card (see Section 2.3). ID1 is a 4-digit integer used as one set of indentured level codes. Uses of ID1 are shown in Figures III-2, -3, and -4.

2.3 Basic Table Format

(U) The Basic Table format is presented in seven parts in Figure III-5:

(a) 'ZIP' Control card
(b) Table Title card
(c) Column Headings card(s)
(d) Row cards
(e) End of Table card
(f) Constants cards

An example of a complete Basic Table is included as the seventh part in Figure III-5.

2.4 NEM Basic Tables

(U) The Basic Tables used in NEM are defined beginning in Figure III-6 . The general arrangement is to show on an 80-column coding form the column headings (which differ from table to table, but are fixed for any given table), the row labels which usually can be varied by the User, and typical data entries. The order of appearance is in accordance with the ID1 code shown in Figure III-5.

(U) Opposite each 80-column coding sheet is a page of definitions of the variables and any pertinent notes, e.g., references to related appendices.

FIGURE III-2

ENGAGEMENT TABLE INDEX

Table No.	No. of Extents	Required or Optional		Comments
		Req.	Opt.	
0001	1	X		Engagement structure
0100	1	X		BLU Group Centers
0101	1	X		BLU Group 1 data
o o o				
0115	1	X	X	(One for each Group in Table 0100)
0200	1	X		RED Group Centers
0201	1	X		RED Group 1 data
o o o				
0218	1	X	X	(One for each Group in Table 0200)

FIGURE III-3

MISCELLANEOUS TABLE INDEX

Table No.	No. of Extents	Required or Optional		Comments
		Req.	Opt.	
3110	1	X		Vulnerability Data - Ships
4110	1	X		BLU - Trajectories for Temporary Units
5110	1	X		RED - Trajectories for Temporary Units

FIGURE III-4

SYSTEM TABLE INDEX

Table Number		No. of	Required or Optional		Comments
BLU	RED	Extents	Reqd.	Opt.	
6110	-	5	X		Ships, Aircraft Carriers
6120	-	5		X	Auxiliary (AOE), if any
6130	8130	5		X	Cruisers, if any
6150	-	5		X	Destroyers, if any
6210	8210	5	X		Aircraft
6310	8330	5		X	Attack Subs (Diesel) if any
6320	8330	5		X	Attack Subs (Nuclear), if any
6510	8510	3	X		Search Radars
6530	8530	1		X	Sonars, if any
6710	8710	3	X		Track Radars
6810	8810	1		X	Countermeasures, if any
7100	9100	1		X	Surface-to-Surface Guns
7200	9200	1		X	Torpedoes
7300	9300	1		X	ASWP
7400	9400	1		X	ASROC, SUBROC
7510	9510	1	X		Surface-to-Air Guns
7511	9517	1	X		Gun Time-of-Flight, etc.
o					
o					
o					
751N	951N	1		X	(One for each type)
7710	9710	1	X		Surface-to-Air Missiles
7711	9711	1	X		SAM Time of Flight, etc.
o					
o					
o					
771N	971N	1		X	(One for each type)
7810	9810	2	X		SSMs and ASMs
7900	9900	1		X	Air-to-Air

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NAME

UNIT

EXT.

DATE

PAGE OF

FIGURE III-5

SEATIDE ANALYSIS PROCESS - NEM INPUTS

BASIC TABLE FORMAT

STATEMENT NO. | FORTRAN STATEMENT | FORTRAN

LOCATION | CONT. | OPERATION | ADDRESS, TAG, DECREMENT | MAP

PAGE SERIAL | A | B | COBOL | IDENTIFICATION

1. Control Card

ZIP 7 1 1 READ BASIC TABLE

where :

Columns 1-4 = alphameric field for control card identifier (ZIP)
5-6 = integer field for data routing code
7-8 = integer field for data routing code
9-10 = integer field for data routing code
11-20 = integer field (various usage)
21-25 = integer field (various usage)
26-30 = integer field (various usage)
31-35 = integer field (various usage)
36-40 = integer field (various usage)
41-80 = alphameric field for description of control card purpose

LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-5 (CONT'D.)

2. Table Title Card

TABLE NO. 6110 -1 70010 12 BLU CATLG-SHIPS-CARRIERS(-1) 19 FEB 73

where :

Columns 1 - 12 = alphameric field for label
13 - 20 = integer field for table identifier
21 - 28 = integer field for table extent identifier. Use minus sign.
29 - 30 = integer field
31 - 35 = integer field for era and sequence identifier
36 - 40 = integer field for number of columns in data table (excluding row nos. and labels)
41 - 70 = alphameric field for table identifier
71 - 80 = alphameric field for date

FIGURE III-5 (CONT'D.)

FORTRAN STATEMENT

FORTRAN

OPERATION | ADDRESS, TAG, DECREMENT | MAP

IDENT

3. Column Headings

SEQ. ITEM	CODE	1. LEN-FT	2. BEM-FT	3. MST-FT	4. DFT-FT	5. DSP-TN	6. RCS-M
		7. VM-KTS	8. RM-NM	9. VC-KTS	A. RC-NM	B. CZONE	C.

where:

Columns 1-16 = alphameric field for row acronym
17-20 = integer field for auxiliary identifier
21-30
31-40
41-50
51-60
61-70
71-80
etc } = alphameric field for column headings. The first two columns in each field are not read and should not be filled.

Note: Only one card is required if there are 6 or less columns.

FIGURE III-5 (CONT'D.)

STATEMENT NO. | FORTRAN STATEMENT | FORTRAN

LOCATION | OPERATION | ADDRESS, TAG, DECREMENT | MAP

COBOL

4. Row Cards

1. CVA-1	6113	1040.	252.	140.	36.	74000.	100000.
1.	6113	33.	3800.	12.	12200.	120.	

where:

Columns 1-3 = integer field for row label number
4 = decimal point field
5-16 = alphameric field for row descriptor
17-20 = integer field for auxiliary identifier
21-30, 31-40, 41-50, 51-60, 61-70, 71-80, etc = real number fields for row data

note: Only one card per row if there are 6 or less columns of real data.

LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-5 (CONT'D.)

5. End of Table Card

-1 Put a minus 1 in columns 1 and 2, and leave rest of card blank

6. Constant Cards

1. X-CENT	1000	2. Y-CENT	400	3. HEADNG	270	4. KNOTS	20
5. STARTX	1500.	6. STARTY	400.	7. RENDVX	700.	8. RENDVY	200.

where:

columns 3-10, 21-30, 41-50, 61-70, etc } = alphameric field for name of constant in following field

columns 11-20, 31-40, 51-60, 71-80, etc } = integer field for constant data named in preceding field. If real numbers are used as constant data, they must be placed on the second constant card in the columns used for constant data

Note: There must always be two cards whether there are any constants or not. If not, put the word CONSTANT in columns 3-10 on both cards and leave the rest blank.

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FIGURE III-5 (CONT'D.)

NAME	
UNIT	DATE
EXT.	PAGE OF

PROGRAM

ROUTINE

7. Example of Basic Table

```
ZIP 7 1 1                                        READ BASIC TABLE
TABLE NØ.   6110          -1   70010      12  BLU CATLG-SHIPS-CARRIERS(-1)    19 FEB 73
SEQ.ITEM            CØDE  1.LEN-FT  2.BEM-FT  3.MST-FT  4.DFT-FT  5.DSP-TN    6.RCS-M
                          7.VM-KTS  8.RM-NM   9.VC-KTS  A.RC-NM   B.CZØNE     C.
  1.CVA-1           6113  1040.     252.      140.      36.       74000.      100000.
  1.                      33.       3800.     12.       12200.    120.
  2.CVA-3           6114  1046.     246.      156.      36.       80800.      100000.
  2.                      33.       3800.     12.       10000.    174.
 15.CVAN-2          6117  1092.     252.      164.      35.       91400.      100000.
 15.                      31.       5000.     20.       12000.    170.
-1
  CØNSTANT
  CØNSTANT
```

FIGURE III-6

NEM BASIC INPUT DEFINITIONS
ENGAGEMENT STRUCTURE
(TABLE 0001)

INPUT NAME		
SEQ	=	An integer right adjusted in cols. 1-3 which uniquely identifies each block of ten tables for each force in the engagement (see TAB). If more than ten tables are required, a sequential integer must be used for each ten-table block. All integers must be unique.
ITEM	=	A ≤ twelve character alpha-numeric designation for each ten-table force, cols. 5-16.
CODE	=	A three-digit integer designating the initial table number of the sequence of ten tables required to describe the force designated under ITEM.
1. TAB thru 0. TAB	=	A three-digit real number denoting the applicable table numbers required for the force designated under ITEM.
TOT. BLU	=	The total number of tables (TAB) used to describe all BLUE forces.
TOT. RED	=	The total number of tables (TAB) used to describe all RED forces.

NOTE: (a) The 3-digit table numbers are merely 4-digit table numbers with the leading zero omitted.

(b) Any table number may be omitted without closing up the gap and the corresponding table can be left in the data file.

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FIGURE III-6 (CONTINUED)

PROGRAM		NAME	
ROUTINE		UNIT	DATE
		EXT.	PAGE OF

```
ZIP 7 1 1                                              READ BASIC TABLE
TABLE NØ.      0001                   70010        10  ENGAGMENT  STRUCTURE
SEQ.ITEM              CØDE   1.TAB     2.TAB           3.TAB      4.TAB      5.TAB      6.TAB
                             7.TAB     8.TAB           9.TAB      A.TAB
  1.BLU FØRCE         100    100.      101.            102.       103.       104.       105.
  1.                         106.      107.            108.       109.
  2.RED FØRCE         200    200.      201.            202.       203.       204.       205.
  2.                         206.      207.            208.       209.
-1
  TØT. BLU             10    TØT. RED              10
  CØNSTANT
```

PAGE, LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-7

NEM BASIC INPUT DEFINITIONS
BLUE/RED GROUP CENTERS
(TABLES 0100, 0200)

INPUT NAME

SEQ = An integer right adjusted in columns 1-3 which uniquely identifies each group. A group is any separate unit or units capable of independent movement or action.

ITEM = A $\leq$ twelve character alpha-numeric designator describing each group, columns 5-16.

CODE = A one to four-digit integer right adjusted in columns 17-20. Columns 19-20 is the (unique) number assigned to the group. Columns 17-18 is a group number (if any) which the group supports. For example, CODE 109 says that group 9 supports group 1.

1. B&R = Two three-digit integers separated by a decimal which denotes the bearing in degrees from north and the range in nautical miles of the group center from the engagement center (XCENT, YCENT) at attack time. A maximum bearing of 360^{o} and maximum range of 999 NM is allowed.

2. ALT = An integer which specifies the group altitude in thousands of feet. Submarines are shown as -, aircraft as +, surface ships as 0.

3. A-Time = The time in hours, decimal, minutes that a group arrives at attack point defined in 1. and 2. First wave attack groups will show a 0. Second wave units will have a positive value.

4. B-Time = The time in hours, decimal, minutes from attack point when a group changes heading to arrive at the attack point. All first wave attack groups will show a negative number.

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NAME
PROGRAM
UNIT
DATE
ROUTINE
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PAGE OF

FIGURE III-7 (CONT'D.)

TYPE	STATEMENT NO.	CONT.	FORTRAN STATEMENT	FORTRAN
	LOCATION	CONT.	OPERATION A / B	ADDRESS, TAG, DECREMENT	MAP	IDENTIFICATION
	PAGE SERIAL				COBOL	

ZIP 7 1 1					READ BASIC TABLE				
TABLE NO.	0100			70010 12	BLU GROUP CENTERS				
SEQ. ITEM		CODE	1. B & R	2. ALT	3. A-TIME	4. B-TIME	5. B-VECT	6. B-ALT	
			7. C-TIME	8. C-VECT	9. C-ALT	A. D-TIME	B. D-VECT	C. D-ALT	
1. BLGP 1		1	0.040	0.0		-.30	270.020	0.0	
1.		1	-1.0	300.020	0.0	-2.0	270.020	0.0	
2. BLGP 2		2	180.040	0.0		-.30	270.020	0.0	
2.		2	-1.0	300.020	0.0	-2.0	270.020	0.0	
3. BLGP 3		3	270.030	0.0		-.30	270.020	0.0	
3.		3	-1.0	300.020	0.0	-2.0	270.020	0.0	
-1									
1. X-CENT		1000	2. Y-CENT	400	3. HEADNG	270	4. KNOTS	20	
5. START X		1500	6. START Y	400	7. RENDVX	700	8. RENDVY	200	

SEQUENCE	LABEL	OPERATION	OPERAND	AUTOCODER	IDENTIFICATION

FIGURE III-7 (Continued)

INPUT NAME

5. B-VECT = Two three-digit integers separated by a decimal which specify the bearing in degrees from north that a group must come to at B-Time (first three-digit number) and the group velocity in knots at B-Time (Second three-digit number). Maximum bearing allowed is 360^{o} and maximum velocity is 999 knots.

6. B-ALT = The group altitude in thousands of feet at B-Time (see 2. ALT).

7. C-Time = The time in hours, decimal, minutes from attack point when a group changes heading to arrive at the B-Time point.

8. C-VECT = Two three-digit integers separated by a decimal that specifies the bearing in degrees from north that a group must come to a C-Time (first three-digit number) and the group velocity in knots at C-Time (second three-digit number).

9. C-ALT = The group altitude in thousands of feet at C-Time (see 2. ALT).

10. D-Time = The time in hours, decimal, minutes from attack point when a group changes heading to arrive at the C-Time point.

11. D-VECT = Two three-digit integers separated by a decimal that specifies the bearing in degrees from north that a group must come to at D-Time (first three-digit number) and the group velocity in knots at D-Time (second three-digit number).

12. D-ALT = The group altitude in thousands of feet at D-Time (see 2. ALT).

1. X-CENT = The X coordinate (east) of the center of the reference engagement area in nautical miles. West is shown as a minus value.

FIGURE III-7 (Continued)

INPUT DATA

2. Y-CENT = The Y coordinate north of the center of the reference engagement area in nautical miles. South is shown as a minus value.

3. HEADING = The heading in degrees from north of the center of the reference engagement area.

4. KNOTS = The movement speed in knots of the center of the reference engagement area.

5. START X = The X coordinate of the departure point for all groups in the engagement. BLUE and RED units will show different values for STARTX, STARTY, RENDVX, RENDVY.

6. START Y = The Y coordinate of the departure point for all groups in the engagement.

7. RENDVX = The X coordinates of the rendezvous point after the engagement of all groups in the engagement.

8. RENDVY = The Y coordinates of the rendezvous point after the engagement of all groups in the engagement.

FIGURE III-8

NEM BASIC INPUT DEFINITIONS
RED AND BLUE GROUP COMPOSITION
(TABLES 01XX, 02XX)

INPUT NAME		
SEQ	=	An integer which uniquely identifies each unit in a group, cols. 1-3.
ITEM	=	A twelve character alpha-numeric designator for each unit in the group, cols. 5-16.
TYPE	=	A four digit integer which specifies the particular type of unit in the group. These designators are described in Appendix B. A zero will remove the unit from the engagement.
1. QTY	=	A real number specifying the number of units of TYPE XXXX present in the engagement. If a unit is to be removed, a zero in this column will do so.
2. RANGE	=	A real number showing the distance in nautical miles between a unit and the group center.
3. D-BRNG	=	A real number showing the relative bearing in $\pm$ degrees from the heading of the group center to the unit.
4. VALUE	=	A real number showing the relative value of units in the engagement (see Appendix M for details).
5. VCRUSE	=	A real number specifying the cruising speed in knots of the unit. For aircraft, this velocity is for sea level conditions.
6. VMAX	=	A real number specifying the maximum speed in knots of the unit. For aircraft, this velocity is for sea level conditions.

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NAME
UNIT
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FIGURE III-8 (CONT'D.)

PROGRAM
ROUTINE

FORTRAN STATEMENT

FORTRAN IDENTIFICATION

LOCATION OPERATION ADDRESS, TAG, DECREMENT MAP

PAGE SERIAL A B COBOL

```
ZIP 7 1 1                                   READ BASIC TABLE
TABLE NO.    0101                  70010  6 BLU GROUP 1
SEQ.ITEM          TYPE  1.QTY   2.RANGE  3.D-BRNG  4.VALUE  5.VCRUSE  6.VMAX

  1.CG   1        6132   1.0      0.0       0.0       80.       10.       30.
  2.DD   2        6153   1.0     10.0      30.        20.       10.       30.
  3.DD   1        6153   1.0     10.0     330.        20.       10.       30.
- 1
  CONSTANT
  CONSTANT
```

LABEL OPERATION OPERAND AUTOCODER

FIGURE III-9

NEM BASIC INPUT DEFINITIONS
RED AND BLUE CATALOG - VULNERABILITY DATA (NON-NUC)
(TABLE 3110)

INPUT NAME

SEQ	=	an integer right adjusted in cols. 1-3 which uniquely identifies each item in the table.
ITEM	=	a $\leq$ twelve character alphameric designator describing each element in the table.
1. CODE	=	a three digit code showing the number of ITEM's in the table (first digit) and the number of data columns (last two digits) in the table. For all ITEMS after 1, code denotes the vulnerability table reference number described in Table 61XX.
2. WT-1 thru C. WT-11	=	column headings for eleven data inputs
HEWT/LBS	=	the column headings are shown on two lines of data for HEWT/LBS. The headings are in terms of total cumulative pounds of high explosive warheads detonated on a particular target class. The data headings shown are for 250 - 12,000 pounds.
SHIPS	=	data shown in columns 2. - C. show the probability of sinking as a function of cumulative pounds of high explosive warheads delivered. The data is matched row by row to the column headings described under HEWT/LBS.

NOTE: Source for these data is the DIA Physical Vulnerability Handbook - Non-Nuclear Weapons.

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PROGRAM

ROUTINE

NAME

UNIT

EXT.

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PAGE OF

FIGURE III-9 (CONT'D.)

CARD FORM #	STATEMENT NO.	CONT.	FORTRAN STATEMENT						FORTRAN IDENTIFICATION
	LOCATION	CONT.	OPERATION	ADDRESS, TAG, DECREMENT				MAP	
PAGE	SERIAL		A	B				COBOL	
ZIP 7 1 1					READ BASIC TABLE				
TABLE NO.	3110		-1	70010	12	VULNERABILITY DATA-NONNUC-SHIPS			9-1-73
SEQ. ITEM			1. CODE	2. WT-1	3. WT-2	4. WT-3	5. WT-4		6. WT-5
			7. WT-6	8. WT-7	9. WT-8	A. WT-9	B. WT-10		C. WT-11
1. HEWT/LBS			212.	250.	1000.	2000.	3000.		4000.
1.			5000.	6000.	7000.	8000.	10000.		12000.
2. SHIPS			1.	.01	.03	.1	.2		.3
2.			.5	.8	.85	.9	.96		.99
-1.									
CONSTANT									
7 CONSTANT									

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-10
NEM BASIC INPUT DEFINITIONS
BLUE AND RED CATALOG - TRAJECTORIES
(TABLES 41XX, 51XX)

INPUT NAME	
SEQ =	An integer right adjusted in cols. 1-3 which uniquely identifies each trajectory in the catalog.
ITEM =	A ≤ twelve character alphameric designator describing each trajectory in the catalog.
TRAJ =	A three digit code describing each trajectory in the table. The first digit designates the trajectory type, i.e., 1, and the second two digits designate alternate trajectory that can be used if desired. The primary trajectory to be used is designated 01.
1. CODE =	A three digit code which specifies the number of legs in the trajectory (first digit) and the longest cruise leg (last two digits).
2. RMX RMN =	Two three digit numbers separated by a decimal showing the maximum range in nautical miles for which the trajectory is applicable (first three digits) and the minimum range (last three digits).
3. R1/V1 =	Two four digit numbers separated by a decimal which shows the total distance in nautical miles covered during the first leg of the trajectory (first four digits) and the average velocity in knots during that leg.
4. H1-KFT =	The altitude of leg 1 in thousands of feet.
5. R2/V2 =	Same as R1/V1, except for leg 2.
6. H2-KFT =	Same as H1-KFT, except for leg 2.
7. R3/V3 =	See R1/V1.
8. H3-KFT =	See H1-KFT.
9. R4/V4 =	See R1/V1.
10. H4-KFT =	See H1-KFT.
11. R5/V5 =	See R1/V1.
12. H5-KFT =	See H1-KFT.

NOTE: A diagram explaining the trajectory coded as 101 is shown on the following page.

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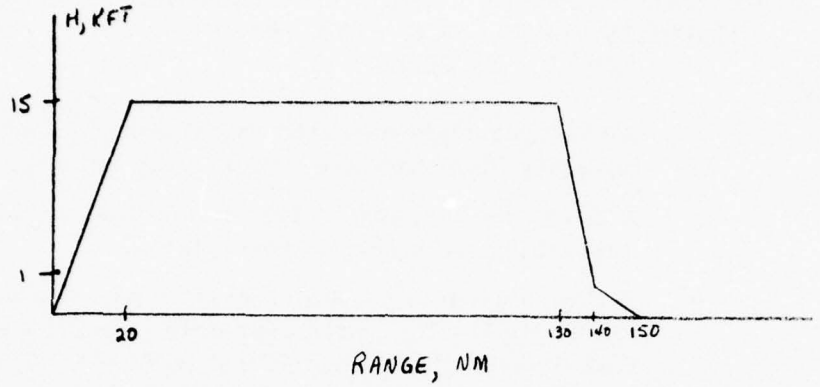
PROGRAM | ROUTINE | NAME | UNIT | EXT. | DATE | PAGE OF

FIGURE III-10 (CONT'D.)

```
ZIP  7 1 1                                    READ BASIC TABLE
TABLE NØ.      4110          -1  70010    12  BLU CATLG-TRAJ FØR TEMP UNITS   5-1-73
SEQ.ITEM           TRAJ  1.CØDE-A  2.RMXRMN   3.R1/V1   4.H1-KFT  5.R2/V2    6.H2-KFT
                         7.R3/V3   8.H3-KFT   9.R4/V4   A.H4-KFT  B.R5/V5    C.H5-KFT
  1.SSM-1          101   402.      150.070    20.0500   0.        110.0800   15.
  1.               101   10.0800   15.        10.0800   1.
  2.SSM-1          102   302.      70.015     5.0500    0.        55.0800    3.
  2.               102   10.0800   3.
-1
 CØNSTANT
 CØNSTANT
```

PAGE | LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-10 (CONT'D.)



LEG NO	R	H-KFT	V-KTS
1	20	0	500
2	110	15	800
3	10	15	800
4	10	1	800
5	0	0	---

RMAX = 110

RMIN = 70

FIGURE III-11

NEM BASIC INPUT DEFINITIONS
BLUE/RED CATALOG - SHIPS, SUBMARINES
(TABLES 61XX, 63XX, 81XX, 83XX)
(TABLE EXTENT - 1)

INPUT NAME			
SEQ.		=	An integer right adjusted in columns 1-3 which uniquely identifies each ship in the catalog.
ITEM		=	A ≤ twelve character alphameric designator describing each ship in the catalog.
CODE		=	A four digit integer which serves as a unique identifier for the particular ship (i.e., FORRESTAL) that is described under ITEM (CVA-3). These codes are defined in Appendix B.
1.	LEN-FT	=	A real number showing the ship length in feet.
2.	BEM-FT	=	A real number showing the ship beam in feet.
3.	MST-FT	=	A real number showing the effective radar mast height of the ship in feet. This value is estimated at 80% of the overall height of the ship.
4.	DFT-FT	=	A real number showing the ship draft in feet.
5.	DSP-TN	=	A real number showing the ship displacement in tons.
6.	RCS-M	=	A real number specifying a typical radar cross section for the ship in square meters.
7.	VM-KTS	=	A real number for the ships maximum speed in knots.
8.	RM-NM	=	A real number showing the ships range in nautical miles at maximum speed.
9.	VC-KTS	=	A real number showing the ships cruising speed in knots.
A.	RC-NM	=	A real number showing the ships range in nautical miles when traveling at cruise speed.
B.	VUL/0	=	the non-nuclear vulnerability table number for ship (see Table 3110)
C.	VUL/1	=	a five digit number showing the relative hardness to nuclear weapons in terms of a 20 KT weapon and a damage level equal to sinking (first 2 digits);

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NAME
PROGRAM
UNIT
DATE
ROUTINE
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PAGE OF

FIGURE III-11 (CONT'D.)

TYPE	STATEMENT NO.	CONT.	FORTRAN STATEMENT										FORTRAN	IDENTIFICATION
LOCATION		CONT.	OPERATION		ADDRESS, TAG, DECREMENT								MAP	
PAGE	SERIAL		A	B									COBOL	
			ZIP	7 1 1							READ BASIC TABLE			
			TABLE NO.	6110		-1	70010	12	BLU CATLG-SHIPS-CARRIERS(-1)					19 FEB 73
			SEQ. ITEM		CODE	1. LEN-FT	2. BEM-FT		3. MST-FT		4. DFT-FT		5. DSP-TN	6. RCS-M
						7. VM-KTS	8. RM-NM		9. VC-KTS		A. RC-NM		B. VUL/0	C. VUL/1
			1. CVA-1		6113	1040.	252.		140.		36.		74000.	100000.
			1.		6113	33.	3800.		12.		12200.		1.	200.00
			2. CVA-2		6114	1046.	246.		156.		36.		80800.	100000.
			2.		6114	33.	3800.		12.		10000.		2.	301.51
			-1											
			CONSTANT											
			CONSTANT											

PAGE	LINE	LABEL	OPERATION	OPERAND	AUTOCODER	IDENTIFICATION

FIGURE III-11 (Continued)

a real number showing whether the target is susceptible to overpressure (0) or dynamic pressure (1) (third digit); a real number referred to as the K factor (fourth digit); and a real number showing whether ground burst (0), or optimum height of burst (1) is to be used (fifth digit). (See DIA Nuclear Vulnerability Handbook).

FIGURE III-12

NEM BASIC INPUT DEFINITIONS
BLUE/RED CATALOG - AIRCRAFT
(TABLES 62XX, 82XX)
(TABLE EXTENT -1)

INPUT NAME		
SEO.	=	An integer right adjusted in columns 1-3 which uniquely identifies each aircraft in the catalog.
ITEM	=	A $\leq$ twelve character alphameric designator describing each aircraft in the catalog.
CODE	=	A four digit integer which serves as a unique identifier for the particular aircraft that is described under ITEM. These codes are defined in Appendix B.
1. LEN-FT	=	A real number showing the aircraft length in feet.
2. SPAN-F	=	A real number showing the maximum wingspan of the aircraft in feet.
3. HI-FT	=	The overall height of the aircraft in feet.
4. RCS-M	=	A real number specifying the average radar cross section of the aircraft in square meters.
5. VC-SL	=	The cruise speed in knots of the aircraft at sea level.
6. VMX-SL	=	The maximum speed in knots of the aircraft at sea level.
7. ALT-KF	=	The operational altitude of the aircraft in thousands of feet.
8. VC-ALT	=	The cruise velocity of the aircraft in knots at the operational altitude, ALT-KF.
9. VMX-AL	=	The maximum velocity of the aircraft in knots at the operational altitude, ALT-KF.
A. RC-ALT	=	The aircraft rate of climb at ALT-KF in thousands of feet per minute.
B. RC-SL	=	The aircraft rate of climb at sea level in thousands of feet per minute.
C. ZMX-KF	=	The maximum allowable altitude of the aircraft in thousands of feet.

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FIGURE III-12 (CONT'D.)

Location (1-11)	Operation (12-15)	16-20	21-30	31-40	41-50	51-60	61-72	Identification (73-80)
ZIP 7 1 1					READ BASIC	TABLE		
TABLE NØ.	621	0	-1	70010 12	BLU CATLG	-ACFT(-1)		19 FEB 73
SEQ. ITEM		CODE	1. LEN-FT	2. SPAN-F	3. HI-FT	4. RCS-M	5. VC-SL	6. VMX-SL
			7. ALT-KF	8. VC-ALT	9. VMX-AL	A. RC-ALT	B. RC-SL	C. ZMX-KF
1. VF-2		6212	54.5	35.66	15.8	5.0	300.	600.
1.		6212	35.0	478.	530.	9.0	23.	37.8
2. VA-3		6223	46.1	38.73	16.0	5.0	300.	460.
2.		6223	28.0	402.	460.	.7	4.2	29.2
-1								
CØNSTANT								
CØNSTANT								

FIGURE III-13

NEM BASIC INPUT DEFINITIONS
BLUE/RED CATALOG - SHIPS, SUBMARINES, AIRCRAFT
TABLE EXTENTS -2, -3, -4
(TABLES 61XX, -63XX, 81XX, -83XX)

INPUT NAME		
SEQ.	=	An integer right adjusted in columns 1-3 which uniquely identifies each unit in the catalog.
ITEM	=	A ≤ twelve character alphameric designator describing each unit in the catalog.
CODE	=	A four digit integer which serves as a unique identifier for a particular unit of the type described under ITEM. These codes are defined in Appendix B.
1. SR-1/O etc.	=	There is no consistent meaning of these labels. They are not read by the computer and only serve as a guide for the analyst. The important thing to note is that within the ten column fields shown as 1.XXX to C.XXX, all equipment and weaponry carried by each unit designated under ITEM and CODE, must be shown as a six digit real number. The first four digits represent the code designator for the particular equipment or weapon. The last two digits reflect the quantity of each equipment/launchers carried on board. Typically, electronic equipment such as radars, fire control systems, and passive sensors are placed in the -2 extent tables; countermeasure, command and control, and sonars are placed in -3 extent tables, and weapons in -4 extent tables.

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NAME

PROGRAM

UNIT

DATE

ROUTINE

EXT.

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FIGURE III-13 (CONT'D.)

TYPE	STATEMENT NO.	CONT.	FORTRAN STATEMENT	FORTRAN IDENTIFICATION
LOCATION		CONT.	OPERATION A / B	ADDRESS, TAG, DECREMENT
PAGE SERIAL				COBOL MAP
ZIP	7	1	1	READ BASIC TABLE
TABLE NO.			6110 -2	70010 12 BLU CATLG-SHIPS-CARRIERS(-2) 19 FEB 73
SEQ. ITEM			CODE	1.SR-1/Q 2.SR-2/Q 3.SR-3/Q 4.SR-4/Q 5.WR-1/Q 6.WR-2/Q
				7.FC-1/Q 8.FC-2/Q 9.FC-3/Q A.FC-4/Q B.FC-5/Q C.FC-6/Q
	1.CVA-1		6113	6514.01 6517.01 6524.01 6611.00 6614.00
	1.		6113	6714.02
	2.CVA-2		6114	6514.01 6517.01 6522.01 6524.01 6612.00 6614.00
	2.		6114	6713.03
-1				
	CONSTANT			
	CONSTANT			

PAGE | LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-14
NEM BASIC INPUT DEFINITIONS
BLUE/RED CATALOG - SHIPS, SUBMARINES, AIRCRAFT
TABLE EXTENT - 5
(TABLES 61XX-63XX, 81XX-83XX)

INPUT NAME	
SEQ =	An integer right adjusted in cols. 1-3 which uniquely identifies each unit in the catalog.
ITEM =	A $\leq$ twelve character alphameric designator describing each unit in the catalog.
CODE =	A four digit integer which serves as a unique identifier for a particular unit of the type described under ITEM. These codes are defined in Appendix B.
1. SSGUNS = etc.	Although there is no consistent meaning of these labels, labels on Extent-5 tables should agree with the label on Extent-4 tables, since for every -4 table there must be a -5 table. The data shown in -5 tables reflects the equipment and weaponry carried by each unit designated under ITEM and CODE. They are shown as a 6 digit number, with the first 4 digits representing the code designator for the particular equipment or weapon. The last 2 digits reflect the number of weapons per launcher carried on board. If the number 99 appears as the last 2 digits, the number of weapons per launcher is considered to be unlimited (i.e., AAGUNS, SSGUNS, etc.).

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PROGRAM | NAME
ROUTINE | UNIT | DATE
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FIGURE III-14 (CONT'D.)

LOCATION (1-7)	OPERATION (8-15)	ADDRESS, TAG, DECREMENT (16-20)	21-30	31-40	41-50	51-60	61-72	IDENTIFICATION (73-80)
ZIP 7	1 1				READ BASIC	TABLE		
TABLE NØ.	6130		-5	70010 12	BLU CATLG	-SHIPS-CRU	ISERS(-5)	9 -1- 73
SEQ. ITEM		CØDE	1. SSGUNS	2. TORP	3. ASWP	4. ASRC	5. HS1	6. HS2
			7. AAGUN1	8. AAGUN2	9. SAM-1	A. SAM-2	B. SAM-3	C. SAM-4
1. CA		6131	7111.99					
1.		6131	7513.99	7511.99				
2. CG		6132		7212.04		7411.04		
2.		6132	7513.99		7713.48	7711.48		
3. CLG		6134						
3.		6134	7512.99	7513.99	7713.24			
4. CGN		6137		7212.04		7411.04		
4.		6137	7513.99		7713.24	7712.48		
CØNSTANT								
CØNSTANT								

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-15

NEM BASIC INPUT DEFINITIONS
BLUE/RED CATALOG - RADARS
(TABLES 65XX, 67XX, 85XX, 87XX)
(Table Extent -1, -2, -3)

INPUT NAME (TABLE -1)		
SEQ.	=	An integer right adjusted in columns 1-3 which uniquely identify each radar in the catalog.
ITEM	=	A $\leq$ twelve character alphameric description for each radar in the catalog.
TYPE	=	A four digit integer which serves as a unique identifier of the particular radar that is described under ITEM. These type codes are described in Appendix B.
1. BETA	=	Clear range parameter in nautical miles.
2. ALFA	=	Self screening range parameter in nautical miles.
3. XLAMDA	=	Radar wavelength in centimeters.
4. PWR	=	Peak transmitting power in watts.
5. GTDB	=	Transmit radar antenna gain in decibels.
6. GRDB	=	Receiver radar antenna gain in decibels.
7.	=	Not used.
8. XNFDB	=	Radar receiver noise figure in decibels.
9. BR	=	Radar receiver bandwidth in hertz.
A. XLTDB	=	Radar system losses ahead of RF amplifier in decibels.
B. XLRDB	=	Receiver losses such as efficiency or antenna pattern in decibels.
C. XLSDB	=	Radar system losses in decibels.
(TABLE -2)		
SEQ.	=	See above.
ITEM	=	See above.
TYPE	=	See above.

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PROGRAM | NAME | UNIT | DATE

ROUTINE | EXT. | PAGE OF

FIGURE III-15 (CONT'D.)

```
ZIP  7 1 1                                       READ BASIC TABLE
TABLE NØ.   6510           -1   70010     12   BLU CATLG-SEARCH RADARS (-1)    19 FEB 73
SEQ.ITEM         TYPE  1.BETA      2.ALFA      3.XLAMDA   4.PWR       5.GTDB      6.GRDB
                       7.          8.XNFDB     9.BR       A.XLTDB     B.XLRDB     C.XLSDB
  1.RADAR-1      6514  16.         8.          5.5        2.85  E5    30.         30.
  1.             6514              14.         5.0   E6   1.          3.          7.
  2.RADAR-2      6516  180.        13.         135.       7.5   E5    18.5        18.5
  2.             6516              4.          9.4   E4   1.          1.          7.
-1
  CØNSTANT
  CØNSTANT

ZIP  7 1 1                                       READ BASIC TABLE
TABLE NØ.   6510           -2   70010     12   BLU CATLG-SEARCH RADARS (-2)    19 FEB 73
SEQ.ITEM         TYPE  1.MØD       2.TAU       3.PRF      4.FAN       5.PCRAT     6.
                       7.ITYPE     8.PHIZER    9.RATE1    A.BWA       B.BWE       C.TILT
  1.RADAR-1      6514  1.          1.17        610.       1.          1.
  1.             6514  2.          5.          102.       1.8         16.         2.5
  2.RADAR-2      6516  1.          10.         300.       1.          1.
  2.             6516  1.          0.          90.        20.         26.         5.
-1
  CØNSTANT
  CØNSTANT
```

PAGE | LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-15 (CONT'D.)

INPUT NAME
(TABLE -2 (Continued))

1.	MOD	=	Type of modulation used; 1 = uncompressed pulse, 2 = pulse compression.
2.	TAU	=	Radar pulse width in microseconds.
3.	PRF	=	Pulse repetition frequency in pulses/second.
4.	FAN	=	Frequency agility factor - the number of pulses which change in frequency divided by the reciprocal of the pulse width.
5.	PCRAT	=	Pulse compression ratio.
6.		=	Not used.
7.	ITYPE	=	Type of normalized antenna gain function, 1 = sin X/X pattern, 2 = cosecant squared pattern.
8.	PHIZER	=	Minimum angle of boresight at which the pattern function becomes a cosecant squared function in degrees.
9.	RATE1	=	Antenna azimuth scan rate, in degrees/second.
A.	BWA	=	Antenna azimuth beamwidth in degrees.
B.	BWE	=	Antenna elevation beamwidth in degrees.
C.	TILT	=	Fixed angle between the local horizontal at the radar and the boresight of the radar. TILT is positive if above the radars local horizontal and negative if below it.

(TABLE -3)

SEQ.	=	See above.
ITEM	=	See above.
TYPE	=	See above.
1. TA	=	Antenna temperature in degrees Kelvin.
2. EINSTR	=	Instrument error affecting angle accuracy, in milliradians.
3. TI	=	Integration or smoothing time in seconds.
4. AZ	=	Azimuth component of scan field-of-view, in degrees. Used for MODES=4 (limited volume search).

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FIGURE III-15 (CONT'D.)

PROGRAM | ROUTINE | NAME | UNIT | EXT. | DATE | PAGE OF

```
ZIP  7 1 1                                         READ BASIC TABLE
TABLE NØ.      6510           -3    70010      12  BLU CATLG-SEARCH RADARS(-3)          19 FEB 73
SEQ. ITEM             TYPE    1.TA       2.EINSTR  3.TI       4.AZ       5.EL           6.TF
                              7.         8.        9.         A.         B.             C.MØDES
  1.RADAR-1           6514    350.       .1        .1         1.8        16.            1.
  1.                  6514                                                              1.
  2.RADAR-2           6516    350.       .1        .1         20.        26.            1.
  2.                  6516                                                              1.
-1
  CØNSTANT
  CØNSTANT
```

FIGURE III-15 (CONT'D.)

INPUT NAME
(TABLE -3 (Continued))

5.	EL	=	Elevation component of scan field-of-view, in degrees. Used for MODES=4 (limited volume search).
6.	TF	=	Frame time, in seconds.
7. 8. 9. A. B.		=	Not used.
C.	MODES	=	Operating modes; 1 = search mode, 2 = track mode with simultaneous lobing (monopulse), 3 = track mode with conical scan, 4 = limited volume search.

FIGURE III-16

NEM BASIC INPUT DEFINITIONS
RED AND BLUE CATALOG - SONARS
(TABLES 6530, 8530)

INPUT NAME		
SEQ	=	an integer right adjusted in cols. 1-3 which uniquely identifies each item in the table.
ITEM	=	A twelve character alphameric descriptor for last unit in the table.
CODE	=	A four digit integer which specifies the particular unit of the type described under ITEM. These code descriptions are described in Appendix B.
1. PWR	=	Sonar radiated signal level (active mode), in decibels
2. LN-A	=	active mode omni-directional background noise (self + sea), in decibels
3. NDI-A	=	active mode directivity index, in decibels
4. NRD-A	=	active mode required signal to noise ratio for recognition, in decibels
5. TGT-A	=	target radiated noise (active mode), in decibels
6. - 7.	=	not used
8. LP-P	=	same as 2. above, except passive mode
9. NDI-P	=	same as 3 above, except passive mode.
A. NRD-P	=	same as 4. above, except passive mode.
B. TGT-P	=	same as 5. above, except passive mode
C.	=	not used

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ROUTINE

NAME | UNIT | EXT. | DATE | PAGE OF

FIGURE III-16 (CONT'D.)

```
ZIP 7 1 1                                          READ BASIC TABLE
TABLE NØ.    6530          -11    70010     12   BLU CATLG-SØNARS                                  9 -1 -73
SEQ ITEM          CØDE   1.PWR     2.LN-A         3.NDI-A     4.NRD-A     5.TGT-A             6.
                          7.       8.LN-P         9.NDI-P     A.NRD-P     B.TGT-P             C.
  1.SØNAR-1       6532   140.      -43.           25.         27.         15.
  1.                                -43.           12.         -3.         14.
-1
  CØNSTANT
  CØNSTANT
```

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-17
NEM BASIC INPUT DEFINITIONS
BLUE AND RED CATALOG - COUNTERMEASURES
(TABLES 68XX, 88XX)

INPUT NAME	DEFINITION
SEQ =	An integer which uniquely identifies each unit in the table, cols. 1-3.
ITEM =	A $\leq$ twelve character alphameric designator for each unit in the table, cols. 5-16.
CODE =	A four digit integer which specifies the particular type of unit in the table. These designators are described in Appendix B.
1. F1-MHZ =	The lower frequency of jammer band 1, in megahertz.
2. F2-MHZ =	The upper frequency of jammer band 1, in megahertz.
3. P-WATT =	The radiated power of the jammer in band 1, in watts.
4. GJ-DB =	The jammer antenna gain in band 1, in decibels.
5. F3-MHZ =	The lower frequency of jammer band 2, in megahertz.
6. F4-MHZ =	The upper frequency of jammer band 2, in megahertz.
7. P-WATT =	The radiated power of the jammer in band 2, in watts.
8. GJ-DB =	The jammer antenna gain in band 2, in decibels.
9. F5-MHZ =	The lower frequency of jammer band 3, in megahertz.
A. F6-MHZ =	The upper frequency of jammer band 3, in megahertz.
B. P-WATT =	The radiated power of the jammer in band 3, in watts.
C. GJ-DB =	The jammer antenna gain in band 3, in decibels.

NOTE: If more than three jammer bands are required to describe a particular jammer, each set of three or less bands must be shown as a separate ITEM and CODE.

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PROGRAM | NAME
ROUTINE | UNIT | DATE
| EXT. | PAGE OF

FIGURE III-17 (CONT'D.)

```
ZIP 7 1 1                                  READ BASIC TABLE
TABLE NØ.      8810            -1  70010    12 RED CATLG-CM/CCM(-1)               5-1-73
SEQ.ITEM             CØDE  1.F1-MHZ  2.F2-MHZ  3.P-WATT  4.GJ-DB   5.F3-MHZ  6.F4-MHZ
                           7.P-WATT  8.GJ-DB   9.F5-MHZ  A.F6-MHZ  B.P-WATT  C.GJ-DB
  1.CM-1             8811    200.      225.     2000.               2965.     3035.
  1.                 8811   1000.               3450.     3550.     1000.
  2.CM-2             8812   5390.     5465.      500.               5465.     5540.
  2.                 8812    500.               5540.     5615.      500.
-1
  CØNSTANT
  CØNSTANT
```

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-18
NEM BASIC INPUT DEFINITIONS
BLUE AND RED CATALOG - AAGUNS, SAMS
(TABLES 75XX, 77XX, 95XX, 97XX)
(TIME LINES)

INPUT NAME	
SEQ =	An integer that uniquely identifies each line in the table, cols. 1-3.
ITEM =	A ≤ twelve character alphameric designator of the line data.
1. T-SEC =	With the exception of the first line, all data entered under T-SEC are reference flight times, in seconds, (Time=1, Time=2, Time=3, Time=4, etc.) for which slant ranges will be entered for each combination of Time=X and elevation angle (ANGL-X). The data entered in the first line (506) describes the dimensions of this bordered table - 5 lines of data down and 6 rows of data across.
2. ANGL-1 = etc.	These data are reference elevation angles in degrees for which range data is computed for each Time=X. The numbers extend for each combination of Time-X and ANGL-X represent the slant range that the AAGUN projectiles or SAMS will travel if fired at ANGL-X and allowance to travel a time of TIME-X. The values found in a row for TIME-X are the polar coordinates of the flight contour for that time at selected points between MIN ELEV and MAX ELEV. The derivation of the data and associated methodology are explained in Appendices G and M.
MIN ELEV =	The minimum angle in degrees that the gun or SAM can be fired.
MAX ELEV =	The maximum elevation angle in degrees that the gun or SAM can be fired.
MIN ALT =	The minimum altitude, in nautical miles, that the projectiles or missiles can travel.
MAX ALT =	The maximum altitude, in nautical miles, that the projectiles or missiles can travel.

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NAME

PROGRAM

UNIT

DATE

ROUTINE

EXT.

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FIGURE III-18 (CONT'D.)

TYPE	STATEMENT NO.	CONT.	FORTRAN STATEMENT	FORTRAN IDENTIFICATION
LOCATION		CONT.	OPERATION A / B	ADDRESS, TAG, DECREMENT / MAP
PAGE SERIAL				COBOL

ZIP	7	1	1			READ BASIC TABLE			
TABLE NØ.		7511		-1	70010 6	BLU CATLG-AAGUN1 TIME LINES, NM			5-1-73
SEQ. ITEM				1. T-SEC	2. ANGL-1	3. ANGL-2	4. ANGL-3	5. ANGL-4	6. ANGL-5
	1. ANGLE-DEG			506.	0.	22.5	45.	67.5	90.
	2. TIME-1			0.	0.	0.	0.	0.	0.
	3. TIME-2			2.6	.9868	.986	.95	.875	.84
	4. TIME-3			6.0	1.925	1.92	1.86	1.71	1.63
	5. TIME-4			11.2	2.96	2.95	2.85	2.63	2.52
-1									
	MIN ELEV			0	MAX ELEV 90	MIN ALT	0	MAX ALT	14
	MIN RNG			.5	MAX RNG 2.52	MIN X	0	MAX X	2.52

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PAGE	LINE	LABEL	OPERATION	OPERAND	AUTOCODER	IDENTIFICATION

FIGURE III-18 (CONT'D.)

INPUT NAME	
MIN RNG =	The minimum range, in nautical miles, that the AAGUN or SAM system is allowed to engage targets.
MAX RNG =	The maximum range, in nautical miles, that the AAGUN or SAM system is allowed to engage targets.
MIN X =	The minimum range, in nautical miles, that describes one boundary of the envelope of the AAGUN or SAM system.
MAX X =	The maximum range, in nautical miles, that describes another boundary of the envelope of the AAGUN or SAM system.

FIGURE III-19

NEM BASIC INPUT DEFINITIONS
BLUE AND RED CATALOG - NAVAL WEAPONS
(TABLES 71XX - 75XX, 77XX, 79XX)
(91XX- 95XX, 97XX, 99XX)
(EXTENT -1)

INPUT NAME

SEQ = an integer which uniquely identifies each unit in the table, cols. 1-3.

ITEM = a twelve character alphmeric descriptor for each unit in the table, cols. 5-16.

CODE = a four digit integer which specifies the particular type of unit in the table. These designators are described in Appendix B.

1. RNG = the maximum operational range of the weapon, in nautical miles.

2. V/TRAJ = a five digit number, showing the weapon velocity in knots, and the trajectory type flown. The three digits to the left of the decimal show the velocity. The numbers to the right of the decimal show the specific trajectory type to be used (see tables 41XX, 51XX). If this column is blank, the weapon will be surface/sub-surface launched.

3. WWT/T = A five digit number showing the warhead size in pounds or nuclear yield in kilotons and the warhead type. The number to the right of the decimal will be 0 for HE warheads, 1 for nuclear, and 2 for continuous rod. The four numbers to the left of the decimal show the warhead weight in pounds for types 0, 2 and nuclear yield in kilotons for type 1.

4. REL = total system reliability.

5. SALVO = The weapon salvo size per engagement per platform.

6. R-TIME = The time, in minutes, required between salvos per platform.

7. CEP/PH = a six digit number showing the weapon CEP in feet (numbers to the left of the decimal) and the expected probability of hit (numbers to the right of the decimal). If no PH values are shown, PH will be computed.

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PROGRAM
ROUTINE

FIGURE III-19 (CONT'D.)

NAME
UNIT
EXT.
DATE
PAGE OF

LOCATION / LABEL (1-15)	ADDRESS, TAG, DECREMENT (16-20)	21-30	31-40	41-50	51-60	61-72	IDENTIFICATION (73-80)
ZIP 7 1 1				READ BASIC	TABLE		
TABLE NØ. 7200		-1	70010 12	BLU CATLG-	NAV WPNS-	TORP	5-1-73
SEQ. ITEM	CODE	1. RNG	2. V/TRAJ	3. WWT/T	4. REL	5. SALVO	6. R-TIME
		7. CEP/PH	8. BIASM	9. RL1	A. PKE	B.	C.
1. MK-A	7211	10.	30.	300.0	.8	2.	1.
1.	7211	.8	30.		.8		
2. MK-B	7214	5.	25.	10.1	.8	1.	2.
2.	7214	.8	30.		.8		
/							
CØNSTANT							
CØNSTANT							

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

FIGURE III-19 (Continued)

INPUT NAME		
8. BIASM	=	the missile bias, in mils, that cannot be removed during flight.
9. RL1	=	warhead lethal radius in feet. If blank, lethal radius will be computed.
A. PKE	=	expected probability of kill per engagement
B. -C.	=	not used

NOTE:

a. If PKE not given, it is computed from PH, REL, and SALVO.

b. If PH is not given, it is computed from CEP, BIASM, and RL1. See Appendix L.

FIGURE III-20

NEM BASIC INPUT DEFINITIONS
RED AND BLUE CATALOG - ASMS/SSMS
(TABLES 78XX, 98XX)
EXTENTS -1, -2

INPUT NAME (TABLE -1)		
SEQ.	=	an integer which uniquely identifies each unit in the table, columns 1-3
ITEM	=	a ≤ twelve character alphameric designator for each unit, columns 5-16
CODE	=	a four digit integer which specifies the particular unit of the type described under ITEM. These code designators are described in Appendix B.
1. LEN-FT	=	length of the missile in feet
2. SPAN-F	=	wingspan of the missile in feet
3. HI-FT	=	height of the missile in feet
4. RCS-M	=	typical radar cross section of the missile in square meters
5. RVUL-F	=	the vulnerable radius of the missile in feet
6. - C.		Not used

INPUT NAME (TABLE -2)		
SEQ	=	See above
ITEM	=	See above
CODE	=	See above
1. RNG	=	the weapon range, in nautical miles
2. V/TRAJ to 8. BIASM	=	see notes for table 71XX, etc.

PROGRAMMING AND DATA FORM

NAME

UNIT

EXT.

FIGURE III-20 (CONT'D.)

FORTRAN STATEMENT

	OPERATION	ADDRESS, TAG, DECREMENT						
ZIP 7 1 1					READ BASIC TABLE			
TABLE NØ.	7810		-1	70010 12	BLU CATLG-ASM(-1)			
SEG. ITEM	CØDE	1. LEN-FT	2. SPAN-F	3. HI FT	4. RCS-M	5. RVUL-F	6.	
		7.	8.	9.	A.	B	C.	
1. B-A	7841	26.	12.	2.5	10.	10.		
1.	7841							
2. B-B	7842	17.	6.	1.3	5.	8.		
2.	7842							
-1								
CØNSTANT								
CØNSTANT								
ZIP 7 1 1					READ BASIC TABLE			
TABLE NØ.	7810		-2	70010 12	BLU CATLG-ASM(-1)			5-1-73
SEG. ITEM	CODE	1. RNG	2. V/TRAJ	3. WWT/T	4. REL	5. SALVO	6. R-TIME	
		7. CEP/PH	8. BIASM	9. CØDEM	A. JAMCEP	B. TERM	C. MIDC	
1. B-A	7841	5.	600.04	250.0	.9	2.	5.	
1.	7841	200.	0.	113.99	200.	6751.	6131.	
2. B-B	7842	5.	600.04	250.0	.9	2.	5.	
2.	7842	30.	0.	213.11	30.	6752.	6732.	
-1								
CONSTANT								
CONSTANT								

FIGURE III-20 (Continued)

INPUT NAME

9. CODE M* = a five digit number (i.e., 113.99) specifying the following information:

   (a) First digit: 1 = all inertial system
   2 = airspeed
   3 = doppler

   (b) Second digit: 1 = 1970-1975 data
   2 = 1975-1980 data

   (c) Third digit: 1 = land launched
   2 = sea launched
   3 = air launched

   (d) Fourth digit: a number between 1 and 9 showing the estimated position error of the system. 1 would be very small error.

   (e) Fifth digit: a number between 1 and 9 showing the estimated launch velocity errors of the system. 1 would be very small error and 9 would be very great error.

A. JAMCEP = the expected CEP of the missile, in feet, when jammed.

B. TERM = a four digit number specifying the particular terminal guidance system used by the missile

C. MIDC = a four-digit number specifying the particular mid-course guidance system used by the missile (see Appendix B)

* CODEM - Contains data codes used only by the guidance subroutine called GUID, which is explained elsewhere in the Users Manual.

NOTE: Tables 76XX/78XX for Blue and 96XX/98XX can be combined into a single BLUE table and a single RED table if desired.

NOTE: If PH is not given, it is computed using remaining inputs.

2.5 Table Update and File Maintenance

(U) As indicated earlier, Basic Tables can be loaded onto a permanent data file, FORTRAN File 11. This means that once loaded, these tables can be used until a permanent replacement is desired. Meanwhile, any table could be used repeatedly as the basis of temporary changes needed to study variations in engagement structure or naval systems. Details follow.

2.5.1 Initial Loading or Complete Replacement

(U) Assume that FORTRAN file FT11F001 has been created and KEPT on the RIPTIDE Disk Pack as discussed in Section VI. This need be done only once and is sufficient no matter how many changes or replacements are made to data that is on the file (unless of course there is a serious computer malfunction or a disk pack failure). All that is needed to load the file initially (or to completely replace all that is already on it) is:

(a) Place one or more non-blank characters in columns 2-5 of the PCODE card.

(b) Place a ZIP-3 card ahead of the Basic Tables to be loaded.

(c) Place a ZIP-7-1-1 card ahead of each Basic Table.

(d) After the last table, put any other ZIP-8, ZIP-9 or ZIP-11 cards desired, or only a ZIP-10 card if desired. The run must end with a ZIP-10 in any case.

(e) Retain for future reference the Input Card Image list obtained as this is the only time this particular output is available.

2.5.2 Single Table Replacement - Permanent

(U) To replace a table without altering any other tables, replace the ZIP-7-1-1 card with ZIP-7-1-5 followed by the table. This replaces the data in the same physical location on the disk. Do not use ZIP-7-1-1 as this merely adds the new table to the disk and unnecessarily lengthens the file.

2.5.3 Single Table Update - Temporary

(U) For parametric variations where changes are considered temporary, these can be made with a ZIP-11-1-P, where P is a print level, P=(0,1,2). Immediately following the ZIP-11 card is a NAMELIST read which specifies the row number, column number, and new data value. This is illustrated in Figure III-21 .

(U) In the same computer run, it may be desired to make other changes and loop through again. This may be done with another ZIP-11-1-P card which goes back to the original table and puts in changes, or by using a ZIP-11-2-P card, changes can be put in the temporary table. This saves having to repeat the previous changes and may be easier to do. This also is shown in Figure III-21.

(U) The four integer constants at the bottom of the Basic Tables may be changed by reading in the NAMELIST &NAMVP the desired values for IC1, IC2, IC3, and/or IC4. Likewise for the four real constants read in desired changes for RC1, RC2, RC3, and/or RC4.

2.5.4 Temporary Table Updates - Alternate Ways

(U) ZIP-7-1-4 with a minus 1 in columns 29 and 30 followed by the usual title card and 1 or 2 (as appropriate) column header cards will allow a replacement of one or more selected lines in a table. Follow with the usual -1 and two constant cards. If the minus 1 is omitted on the ZIP-7-1-4 card, the update will be permanent.

(U) Another way is to use a ZIP-7-1-1 card (the normal Basic Table read) except on the Title card put a minus 1 in columns 29 and 30. This requires a complete Basic Table not just a line to be updated.

FIGURE III-21

SINGLE TABLE UPDATE - TEMPORARY

Card	Comment
A, K	Classification Cards
B, L	PCODE Cards
C	ZIP-11-1-2, 7710, -1. This calls for temporary update to table 7710, extent -1.
D	This calls for new data to be put in Row 2, column 7.
E	This calls for new data to be put in Row 3, column 7, and return to the MAIN program for further instructions.
F	ZIP-11-1-2, 7900, -1. This calls for temporary update to table 7900, extent -1.
G	This calls for new data to be put in Row 1, column 10, and return to MAIN.
H	ZIP-8- , etc. Remainder of input desired.
J	ZIP-1. Retain all previous changes and start over.
M	ZIP-11-2-2, 7710, -1. This calls for an update to the previous update by cards C and F.

NOTE: If card M had been ZIP-11-1-2 it would have updated the original table.

FIGURE III - 21 (CONT'D.)
SINGLE TABLE UPDATE
TEMPORARY

```
 *       *       *       *    UNCLASSIFIED    *       *       *       *  (A)
 PGM=NEM. VARY SAM PR$B.$F HIT AND AAM PR$B.$F KILL                RUN= 10 DEC 73 (B)
ZIP 11 12  7710       -1                    UPDATE $RIGINAL TABLE              (C)
 $NAMUP   R$WSEQ= 2, DATA( 7)= 20.10,                    $END                  (D)
 $NAMUP   R$WSEQ= 3, DATA( 7)= 30.10,   RETURN= 1,       $END                  (E)
ZIP 11 12  7900       -1                    UPDATE $RIGINAL TABLE              (F)
 $NAMUP   R$WSEQ= 1, DATA(10)=  0.10,   RETURN= 1,       $END                  (G)
ZIP  8 0 1                                                                    (H)
      etc.

ZIP  1                                    READ NEW CLASSIFICATION AND PC$DE CARD (J)
 *       *       *       *    UNCLASSIFIED    *       *       *       *  (K)
 PGM=NEM. ADDITIONAL VARIATION $F SAM PR$B.$F HIT                             (L)
ZIP 11 22  7710       -1                    UPDATE TEMPORARY TABLE             (M)
 $NAMUP   R$WSEQ= 1, DATA( 7)= 20.10,   RETURN= 1,       $END                  (N)
ZIP  8 0 1                                                                    (P)
      etc.
```

3. NAMELIST INPUT

(U) The definition and use of the NAMELIST variables are presented in this section. The format rules for using NAMELIST input are available in any FORTRAN IV manual. The principal rules are:

(a) The first column on all NAMELIST cards must be blank.

(b) Column 2 of the first card must contain the ampersand "&" followed immediately by the namelist name (e.g., &NAM1) and followed by at least one blank.

(c) Data may begin on the same card as the Namelist name (separated by at least one blank) and has the form: VARIABLE = number, followed by a comma. If the number is an integer (variables whose names begin with I, J, K, L, M, N) no decimal point is to be used. If the number is real, a decimal may be used if necessary.

(d) Do not leave blanks between numbers and their trailing commas.

(e) Not all the variables in the list need be input.

(f) The reading of a Namelist input is terminated by putting ampersand end (&END) after the last comma. It may be on the last card by itself.

3.1 Namelist &NAMUP

(U) The temporary update of a Basic Table as previously described in Section III.2.5.3 is initiated by a ZIP-11 card. Immediately following this is a Namelist &NAMUP card, one for each row to be updated. The variables in this list and their use is defined below. They are in general the elements of a Basic Table which could be changed. Dimensional variables show maximum dimensions.

(a) RØWSEQ. This is the sequence number of the row in the table to be changed. (Originally in column 3 of the Basic Table.)

(b) DATA(12). The data to be used in the specified column.

(c) RØWNAM(3). The name to be put in the specified row, up to 3 four letter words.

(d) IC1, IC2, IC3, IC4. The four integer constants at the bottom of the table.

(e) RC1, RC2, RC3, RC4. The four real constants at the bottom of the table.

(f) CØDE. The four digit number found in columns 17 - 20 of the specified row.

(g) RETURN=1. This is to be used in the last row to be updated in a given table. This returns control to the MAIN program.

3.2 Namelist &DIMENS

(U) This is the first of two Namelist lists to be read immediately after the use of a ZIP-9 CALL XECUTE card. These variables control the use of the dynamic storage during simulation as defined below.

(a) MAXBTU. The maximum number of BLU units that can be on intercept trajectories at the same time. (Default for MAXBTU = KBU = Total no. of BLU units.)

(b) MAXRTU. The maximum number of RED units that can be on intercept trajectories at the same time. (Default for MAXRTU = KRU = Total no. of RED units.)

Note: When an aircraft leaves its normal route to attack a target, it is put on an intercept trajectory to the target. When a cruise missile is launched, it is given temporary unit status and is put on an intercept trajectory. In effect, MAXBTU and MAXRTU establish a limit on the maximum amount of attack interaction during the engagement.

(c) NSYSPU. The average number of subsystems per unit. This value defines the amount of dynamic storage to be allocated for unit subsystem setup. If this value is too small, the routine will stop. (Default for NSYSPU = 10)

3.3 Namelist &NGAGE

(U) This is the second Namelist deck to be read after a ZIP-9 CALL XECUTE card. The &NGAGE deck should immediately follow the &DIMENS deck. Namelist &NGAGE inputs the option and control variables for the engagement.

3.3.1 The following variables are general:

(a) TSTEP. Engagement time increment, hours. (Default for TSTEP = .001 hr.)

Note: .001 hr. is the minimum acceptable value for TSTEP.

(b) TBEGIN. Time to begin the engagement, decimal hours. (Default for TBEGIN=earliest time at which the unit routes are defined. At present this is -4.0 hours, where 0.0 hours is planned time of coordinated attack.)

(c) TIMEND. Time, decimal hours, that the engagement is ended. (Default for TIMEND = latest time for which the unit routes are defined.)

Note: TBEGIN and TIMEND define the interval over which the engagement is evaluated.

(d) NCARLØ. The number of Monte Carlo passes to be executed. (Default for NCARLØ = 1)

(e) NRANDM. The number of times the random number generator is to be called to initialize the generator prior to the engagement simulation. (Default for NRANDM = 1)

3.3.2 The following variables are print control flags:

(a) IPRINT. Print option for output of unit position and status during the engagement (units on normal routes).

IPRINT = 1, print. (Default)

= 0, no print.

(b) PSTART. Start (time) of print interval, hours, during which output of unit position and status is to be printed when IPRINT= 1. Default for PSTART = -100. hours.

(c) PSTØP. End (time) of print interval, hours, during which output of unit position and status is to be printed when IPRINT = 1. Default for PSTØP = 100. hours.

(d) PRSTEP. Specifies the print frequency, hours, for output of unit position and status when IPRINT = 1, and PSTART $\leq$ TIME $\leq$ PSTOP. (Default for PRSTEP = 0.1 hr.) This output is automatically triggered at each node point time defined by the preplanned routes.

(e) ISNAPR. Print option for the Subroutine SNAP to print engagement snapshot data. Print frequency and interval is controlled by PRSTEP, PSTART and PSTØP. (IPRINT must be on)

ISNAPR = 0, no print (Default).
= 1, position and status of units on intercept trajectories.
= 2, debug and checkout print
3, level.

(f) NLPR. Debug and checkout print option causing key subroutine to dump data in Namelist format throughout the simulation.

NLPR = 0, no print (Default).
= 1, print.

(g) KILLPR. Print option flag for Subroutine KILLEX to print weapon effects evaluations in Namelist format.

KILLPR = 0, no print (Default).
= 1, print.

3.3.3 The following variables define detection criteria:

(a) IPRAD. Radar model option flag.

IPRAD = 0, use the Radar Model to compute all radar detection during the engagement. (Default)
=-1, use dummy radar equations in lieu of the Radar Model.
= 1, use the Radar Model with the Radar
2, Model print options turned on. (DEBUG ONLY)

(b) IENV. Sets the radar environment parameter for sea state. Sea State = IENV. (Default for IENV = 4.)

(c) PDTIME. Maximum time, hours, that a computed detection probability can be used without recheck. (Default for PDTIME = .02 hours.)

(d) PDMIN. Minimum threshold probability of detection required to assume a unit detected. (Default for PDMIN = 0.5)

(e) PDTMIN. Minimum threshold probability of detection required of a track radar to assume tracking of the target unit. (Default for PDTMIN = 0.5).

(f) PDCMIN. Minimum threshold probability of detection required of cruise missile acquisition radars to assume target acquisition. (Default for PDCMIN = 0.5)

(g) ISCAN. Number of scans made by the radar in computing a probability of detection. Maximum = 9. (Default for ISCAN = 3)

(h) JAM. Radar jamming option.

JAM = 0, all jammers off (Default)
= 1, all jammers on

Note: Radar jammers are either all on or all off throughout the engagement.

(i) IACTIV. active or passive mode of operation for all sonar systems during the engagement.

IACTIV = 0, passive mode (Default)
= 1, active mode

(j) IBØTTM. Specifies direct path detection or bottom bounce detection criteria to be used in computing detection by sonar systems.

IBØTTM = 1, use bottom bounce (Default)
= 0, direct path only

3.3.4 The following variables are weapon allocation parameters:

(a) AIRCPT. Maximum intercept flyout time, hours, (one way) for aircraft. An aircraft will not leave its normal route to make an intercept where the estimated intercept time exceeds AIRCPT. (Default for AIRCPT = 1.0 hr.)

(b) NXSHIP. The maximum number of units allowed to simultaneously attack a ship target. (Default for NXSHIP = 5) *

(c) NXAC. The maximum number of units allowed to simultaneously attack an aircraft target that is on a normal route. (Default for NXAC = 2) *

(d) NXSUB. The maximum number of units allowed to simultaneously attack a submarine target. (Default for NXSUB = 2) *

(e) NXCM. The maximum number of units allowed to simultaneously attack either a cruise missile unit or an aircraft on an intercept trajectory. (Default for NXCM = 1) *

*Note: The attack limits specified by NXSHIP, NXAC, NXSUB and NXCM hold for both BLUE and RED allocation. If the user wishes to provide unlike limits for BLUE and RED, the variable must be entered as a 4-digit packed integer, e.g., NXSHIP = 0408, would specify a limit of 4 units vs ship targets during BLUE allocation and 8 units vs ship targets during RED allocation.

(f) NBATT. The number of SAM battery combinations defined in the array MISRAD. (Default for NBATT = 7)

(g) MISRAD(2,10). Input array for defining compatible track radar - SAM launcher type combinations of subsystems to form SAM batteries, during engagement setup. MISRAD is dimensioned (2,10) to allow up to ten combinations to be defined.

MISRAD(1,I) = catalog code for the track radar for the Ith combination.
(2,I) = catalog code for the SAM launcher type for the Ith combination

(Default combinations for MISRAD are given below:

MISRAD = 6711, 7713,
6712, 7711,
6713, 7712,
6714, 7714,
8711, 9711,
8713, 9713,
8712, 9712

(h) IRSAM. Two digit integer control variable used in SAM and anti-aircraft gun simulation. The tens digit (when not zero) options for a track radar performance recheck when the SAM reaches the terminal end of the intercept. The units digit (when not zero) constrains SAM and anti-aircraft allocation so that launch and terminal intercept will occur on the same leg of the target flight profile. This option eliminates assumed intercepts across a change in the target velocity vector.

IRSAM = 00, No Radar Recheck, No Flight Profile Constraint (Default)
= 01, Flight Profile Constraint Only
= 10, Radar Recheck Only
= 11, Both Options

(i) IMISC(19). User override for the minimum flight time from aircraft carrier to an aircraft flight station. Flight times between carriers and the stations they support are computed as (distance)/(AC speed). The minimum flight time provides a lower limit for these computed values.

IMISC(19) = 100, = (hours x 1000) = .1 hours = 360 seconds minimum flight time. (Default = 20 = .02 hr.)

(j) IMISC(20). User override for the interval between successive launches of carrier aircraft.

IMISC(20) = 10, = (hours x 1000) = .01 hours = 36 seconds. (Default = 0)

3.3.5 The following variables elect the rendezvous option:

(a) IRNDVB. This variable elects the option for BLUE groups to leave their programmed routes and proceed to the rendezvous point whenever the conditions for rendezvous have been met. (See Appendix I, Engagement Simulation, Vol. IIB)

IRNDVB = 0, No Rendezvous (Default)
= 1, Will Rendezvous

(b) IRNDVR. Same as above but for RED side.

3.3.6 The following variables govern High Value Target classification and pursuit:

(a) PDCLAS. Minimum threshold probability of detection required to assume a unit can be classified.

(Default for PDCLAS = PDMIN, minimum detection threshold)

(b) HVTB. The minimum value for a BLUE ship unit to qualify as a High Value Target.

HVTB = 0., No high value target designation for BLUE units.

HVTB = XXX., All BLUE ship units that have been classified and whose values are ≥ XXX. are designated as high value targets and receive top priority with respect to RED weapon allocation.

(c) HVTR. Same as above but for RED side.

(d) HVTIME. Specifies the time interval, hours, between updates or reassessment and communication of high value target information between offense units. (HVTIME has no meaning if both HVTB and HVTR are input as zero.)

HVTIME = 0., High value target designation occurs at the node point times defined by the preplanned routes. (Default)

= 0.XX, High value target designation occurs each 0.XX hours.

(e) IVECB. Vectoring option flag for BLUE offense groups. IVECB=1, enables each BLUE offense group to depart from its preplanned route and follow a pursuit vector, toward the RED high value target that is closest to the group center. (IVECB has no meaning if HVTR is input as zero.)

(f) IVECR. Same as above but for RED side.

3.4 Namelist &NUCHEK (for Route Check - Sec. V)

(U) This is called by a ZIP-6-1-2 card. Its purpose is to check the planned routes by printing a series of snapshots of unit positions and velocities in a format as shown in Figure IV-11 of Section IV. The times desired are input as follows. Dimension variables show maximum dimension. See Section V for its application.

(a) NTIMES. The number of snapshots desired.

(b) TIMES (10). The Battle times (hours) at which snapshots are desired.

3.5 Namelist &NAM1 (for Radar Check - Sec. V)

(U) This is called by a ZIP-6-2 card. Its purpose is to check the performance of a radar against specified targets flying straight and level at the radar. Target radar cross section, altitude, and velocity, are specified as follows. Dimensioned variables show maximum dimensions. See Figures III-15 and III-17 for basic table format for radar and jammer inputs that are to be tested. See Section V for a definition of variables and their application.

(Reverse side blank)

SECTION IV

NEM OUTPUTS AND FORMATS

(U) The purpose of this section is to define the outputs of the Naval Engagement Model. Only the essentials of definition and format are given. Applications and analysis of output is treated elsewhere.

(U) The output is illustrated with pages from the Training-Baseline ASM computer run. This is a "small" engagement having about one-half the number of groups now available in the catalog, hence the output is typical but less than that of a large engagement.

(U) The method of presentation is a series of figures consisting of a page of computer print out and a facing page of text.

FIGURE IV-1

INPUT CARD IMAGES

(U) Since most of the engagement and naval systems data is stored on magnetic disk, only a few input cards are required at run time. Their details are defined in Section III but are commented on as follows:

Card	Comment
1	Classification. Printed top and bottom each page.
2	PCODE. Problem Code, identifies a particular run. Printed top of each page.
3-13	Replace Basic Table with this one, the small engagement. Permanent.
14-31	A series of temporary changes* to be used only in this run. See Section III.2.5.3
32	ZIP-8-0-1 Setup the particular engagement called for by Table 0001 and any of the above changes.
33	Execute a simulation using the following data.
34-45	Simulation and print control. See Section III.3.2 and III.3.3 and Figure IV-10.
46	ZIP-10. Stop. End of computer run.

*note: The temporary changes do these things:

(1) Specifies Prob. of Hit on two BLU SAMs,

(2) Specifies Prob. of Kill per engagement on one BLU AAM,

(3) Increases the number of airplanes carrying cruise missiles to four and changes them all to one type (8227) in RED groups 5, 7, 9, 12, and 14. This causes them all to carry the same ASM,,

(4) Changes the applicable missile trajectory to a 150 NM trajectory by changing the Max Rng and the length of the 2nd leg. from that now in the catalog.

```
*      **      **      **    NEM  TEST    **.     **      **      **

PGM=NEM. TRAINING. BASELINE ASM                          RUN= 17 JAN 73      PAGE  2

INPUT CARD IMAGES

1. *      **      **      **    NEM  TEST    **      **      **      **
2. PGM=NEM. TRAINING. BASELINE ASM                       RUN= 17 JAN 73
3.ZIP  7 1 5                          REPLACE BASIC TABLE ON DISK 11
4.TABLE NO.   0001              70011   12 ENGAGEMENT STRUCTURE (SMALL)    8-20-73
5.SEQ.ITEM        CODE  1.TAB    2.TAB    3.TAB    4.TAB    5.TAB    6.TAB
6.                      7.TAB    8.TAB    9.TAB
7.  1.BLU FORCE    100    100.     101.     104.     105.     108.     109.
8.  1.             110
9.  2.RED FORCE    200    200.     201.     202.     203.     204.     206.
10. 2.             210    214.     215.     216.     205.     207.     209.
11.-1
12.  TOT BLU          6  TOT RED          9
13.  CONSTANT
14.ZIP 11 1 2  7710       -1          UPDATE ORIGINAL TABLE
15. &NAMUP ROWSEQ=  2., DATA( 7)= 20.20,                              &END
16. &NAMUP ROWSEQ=  3., DATA( 7)= 30.20,                  RETURN=1.,  &END
17.ZIP 11 1 2  7900       -1          UPDATE ORIGINAL TABLE
18. &NAMUP ROWSEQ=  1., DATA(10)=  0.20,                  RETURN=1.,  &END
19.ZIP 11 1 2  0205        0          UPDATE ORIGINAL TABLE, PUT IN AS[illegible]
20. &NAMUP ROWSEQ=  1, CODE= 8227, DATA( 1)= 4,           RETURN=1.,  &END
21.ZIP 11 1 2  0207        0          UPDATE ORIGINAL TABLE, PUT IN AS[illegible]
22. &NAMUP ROWSEQ=  1, CODE= 8227, DATA( 1)= 4,           RETURN=1.,  &END
23.ZIP 11 1 2  0209        0          UPDATE ORIGINAL TABLE, PUT IN AS[illegible]
24. &NAMUP ROWSEQ=  1, CODE= 8227, DATA( 1)= 4,           RETURN=1.,  &END
25.ZIP 11 1 2  0212        0          UPDATE ORIGINAL TABLE, PUT IN AS[illegible]
26. &NAMUP ROWSEQ=  1, CODE= 8227, DATA( 1)= 4,           RETURN=1.,  &END
27.ZIP 11 1 2  0214        0          UPDATE ORIGINAL TABLE, PUT IN AS[illegible]
28. &NAMUP ROWSEQ=  1, CODE= 8227, DATA( 1)= 4,           RETURN=1.,  &END
29.ZIP 11 1 2  5110       -1          UPDATE. AS[illegible]RNG,ALT,VEL.
30. &NAMUP ROWSEQ= 71, DATA= 402, 150.030, 5.0450, 40.000, 120.0860, 40.000,
31.       15.0550, 40.000, 10.0600, 1.060,                RETURN=1.,  &END
32.ZIP  8 0 1                         SETUP.  PRINT LEVEL=1   RUN=19 JAN 74
33.ZIP  9                             CALL XECUTE
34. &DIMENS
35.  MAXBTU=50,MAXRTU=75,
36. &END
37. &NCAGE
38. IPRAD= -1
39.    NPHASE=6,
40.  PRSTEP=.03,TSTEP=.003,TBEGIN=0.,TIMEND=1.0,
41.  TBEGIN=-.2,
42.  IMISC(5)=1,
43.  PRSTEP=.1,
44.  IMISC(7)=1,
45. &END
46.ZIP 10                             STOP

*      **      **      **    NEM  TEST    **      **      **      **
```

CLASSIFICATION

PCODE

REPLACE BASIC TABLE 0001 WITH THIS ONE (SMALL ENGAGEMENT).

A SERIES OF TEMPORARY CHANGES TO BE USED ONLY IN THIS RUN.

SETUP — EXECUTE SIMULATION

SIMULATION AND PRINT CONTROL

STOP. END OF COMPUTER RUN.

FIGURE IV-1
INPUT CARD IMAGES

FIGURE IV-2

REPLACE BASIC TABLE 0001

(U) This is a return of the new table that has been permanently placed on the disk as a result of Cards 3-13 in Figure IV-1. These are not card images, but are data retrieved and printed in analogous format. Note that the second "card" is offset to the right to help identify Basic Table columns 7 thru 12.

FIGURE IV-2
REPLACE BASIC TABLE 0001

```
            *       **       **       **      NEM   TEST     **       **       **       **

PGM=NEM. TRAINING. BASELINE ASM                                   RUN= 17 JAN 73      PAGE   4

ZIP  7 1 5        C    0    0    0    0  REPLACE BASIC TABLE ON DISK 11

IC1=   10000,   ID2=         0,   ID3=   0
TABLE NO.    10000          0   070011   12 ENGAGEMENT STRUCTURE (SMALL)     8-20-73
 ROW  SEQ. ITEM            CODE     1.TAB            2.TAB         3.TAB          4.TAB          5.TAB          6.TAB
                                           7.TAB           8.TAB           9.TAB

   1    1. BLU FORCE       1CO    100.000          101.000         104.000        105.000        1C8.000        109.000
                                          0.0             0.0             0.0            0.0            0.0            C.C

   2    2. RED FORCE       200    200.000          201.000         202.000        203.000        204.000        206.000
                                       214.000          215.000         216.000        205.000        207.000        209.000

     INTEGER         TOT BLU              6    TOT RED             9                    0                    0
     REAL            CONSTANT 0.0                       0.0                  0.0                  0.0

            *       **       **       **      NEM   TEST     **       **       **       **
```

FIGURE IV-3

UPDATE ORIGINAL TABLES
7710 & 7900

(U) This page is the result of the table update in Cards 14-18.

Item	Comment
A	Rows 2 and 3 in Table 7710 after update (temporary).
B	Table 7710 complete, with both old and updated rows.
C	Row 1 in Table 7900 after update (temporary).
D	Table 7900 complete, after update.
E, F	New CEP/PH for SAM2 and SAM3.
G	New PKE for AAM1.

```
*      **      **      **    NEM  TEST    **      **      **      **

PG*=NEM. TRAINING. BASELINE ASM                          RUN= 17 JAN 73    PAGE  5

ZIP 11 1 2  77100000  -1   0   0   0 UPDATE ORIGINAL TABLE

NEW LINE FOR TABLE WITH ID=  77100000      -1                                        (A)
     2. [redacted] SAM2 7712  0.0          600.000     218.200     0.900000     2.00000     1.00000
                          20.2000     5.00000     18.0000     0.0          0.0         0.0
NEW LINE FOR TABLE WITH ID=  77100000      -1
     3. [redacted] SAM3 7713  0.0          600.000     430.200     0.900000     2.00000     1.00000
                          30.2000     5.00000     15.0000     0.0          0.0         0.0

ID1=77100000,  ID2=     -1,  ID3= -1
TABLE NO. 77100000     -1   C70010   12 BLU CATLG-BASIC SAM DATA          9- 1-73
 ROW  SEQ. ITEM        CODE   1.          2.V/TRAJ    3.WWT/T     4.REL       5.SALVO     6.R-TIME
                             7.CEP/PH    8.BIAS      9.RL1       A.          B.          C.
                                                                                          (B)
   1   1. [redacted] SAM1 7711  0.0          600.000     115.200     0.900000     2.00000     1.00000
                          20.3000     5.00000     15.0000     0.0          0.0         0.0
   2   2. [redacted] SAM2 7712  0.0          600.000     218.200     0.900000     2.00000     1.00000
                          (E) 20.2000 5.00000     18.0000     0.0          0.0         0.0
   3   3. [redacted] SAM3 7713  0.0          600.000     430.200     0.900000     2.00000     1.00000
                          (F) 30.2000 5.00000     15.0000     0.0          0.0         0.0
   4   4. [redacted] SAM4 7714  0.0          600.000     18.0000     0.900000     2.00000     1.00000
                          20.3000     5.00000     5.00000     0.0          0.0         0.0
       INTEGER     CONSTANT          0           0           0            0           0
       REAL        CONSTANT 0.0          0.0         0.0          0.0         0.0

ZIP 11 1 2  79000000  -1   0   0   0 UPDATE ORIGINAL TABLE                           (C)

NEW LINE FOR TABLE WITH ID=  79000000      -1
     1. [redacted] AAM1 7912  5.00000      600.000     25.0000     0.800000     1.00000     0.330000
                     0.0         0.0         5.00000     0.200000     0.0         0.0

ID1=79000000,  ID2=     -1,  ID3= -1
TABLE NO. 79000000     -1   C70010   12 BLU CATLG-NAV WPNS-AAMS           9- 1-73
 ROW  SEQ. ITEM        CODE   1.RNG       2.V/TRAJ    3.WWT/T     4.REL       5.SALVO     6.R-TIME
                             7.CEP/PH    8.BIAS      9.RL1       A.PKE       B.          C.
                                                                                          (D)
   1   1. [redacted] AAM1 7912  5.00000      600.000     25.0000     0.800000     1.00000     0.330000
                     0.0         0.0         5.00000     (G) 0.200000 0.0         0.0
       INTEGER     CONSTANT          0           0           0            0           0
       REAL        CONSTANT 0.0          0.0         0.0          0.0         0.0

ZIP 11 1 2  20500000  0   0   0   0 UPDATE ORIGINAL TABLE, PUT IN [redacted] ASM

*      **      **      **    NEM  TEST    **      **      **      **
```

FIGURE IV-3
UPDATE ORIGINAL TABLES
7710 & 7900

FIGURE IV-4

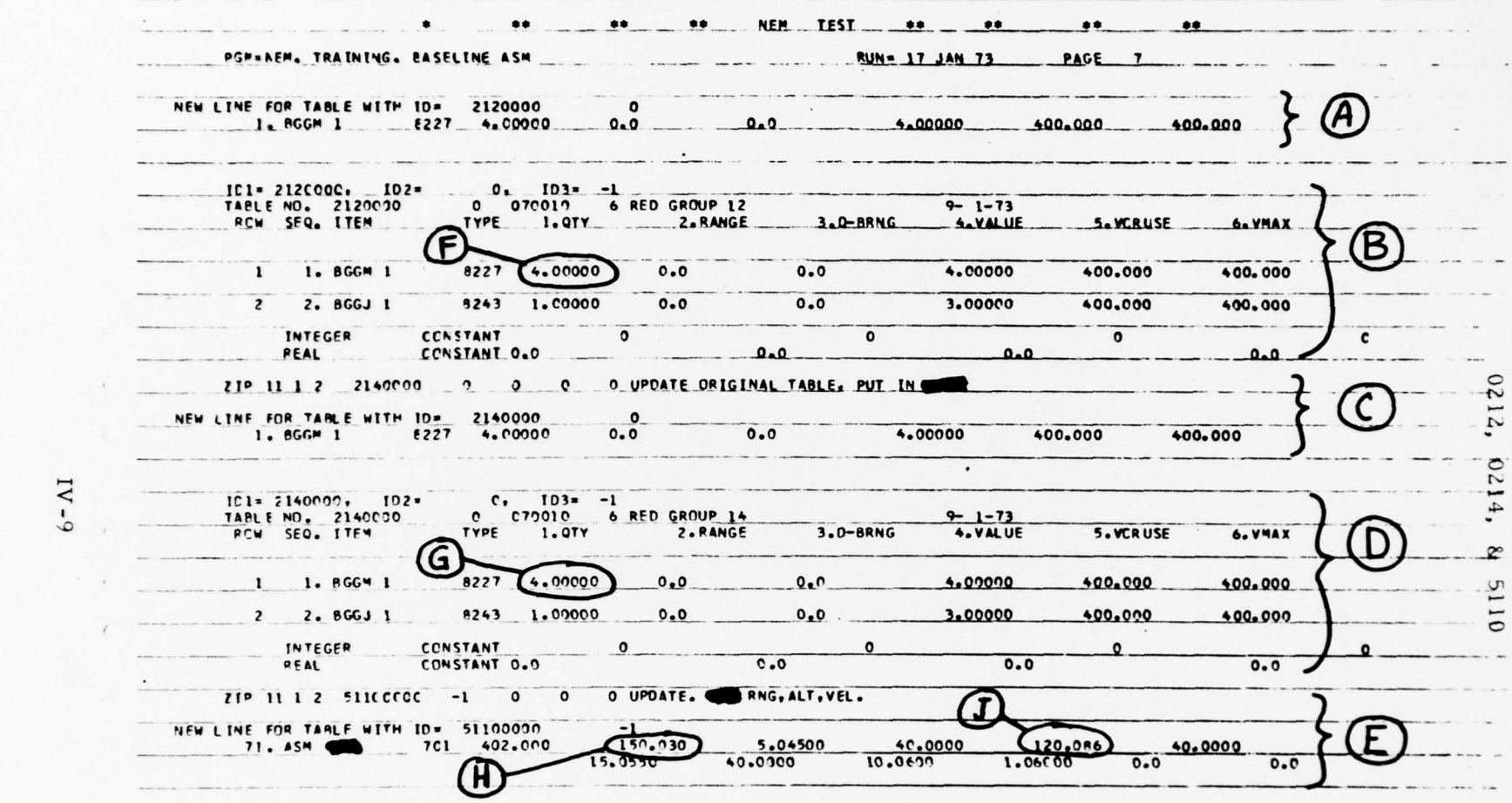
UPDATE ORIGINAL TABLES
0212, 0214, & 5110

Item	Comment
A, B, F	Update Table 0212 to put a quantity of 4 missile-carrying aircraft in RED Group 12.
C, D, E	Update Table 0214 to put a quantity of 4 missile-carrying aircraft in RED Group 14.
E	Update Table 5110 to change an ASM trajectory in line with sequence = 71.
H	New Max Range = 150 NM New min range = 30 NM
J	New range of leg 2 = 120 NM New velocity leg 2 = 860 Knots

AD-A048 340 LTV AEROSPACE CORP DALLAS TEX VOUGHT SYSTEMS DIV F/G 15/7
SEATIDE ANALYSIS PROCESS. VOLUME IIA. NAVAL ENGAGEMENT MODEL (N--ETC(U)
FEB 75 DAAB09-72-C-0062
UNCLASSIFIED VSD-00.1636-VOL-2A-REV-A NL

2 OF 2
AD
A048 340

END
DATE FILMED
2-78
DDC



```
*      **     **     **    NEM  TEST    **     **     **     **

PGM=AEM. TRAINING. BASELINE ASM                    RUN= 17 JAN 73     PAGE  7

NEW LINE FOR TABLE WITH ID=  2120000        0
     1. BGGM 1        8227   4.00000      0.0          0.0          4.00000      400.000      400.000

IC1= 212C000,  ID2=       0,  ID3= -1
TABLE NO.  2120000        0   070010    6 RED GROUP 12                          9- 1-73
 ROW  SEQ. ITEM           TYPE    1.QTY        2.RANGE      3.D-BRNG     4.VALUE      5.VCRUSE     6.VMAX

   1    1. BGGM 1         8227   4.00000      0.0          0.0          4.00000      400.000      400.000

   2    2. BGGJ 1         8243   1.00000      0.0          0.0          3.00000      400.000      400.000

        INTEGER      CONSTANT                  0                         0            0                      C
        REAL         CONSTANT 0.0                        0.0                       0.0          0.0

ZIP 11 1 2  2140000    0    0    0    0 UPDATE ORIGINAL TABLE, PUT IN [redacted]

NEW LINE FOR TABLE WITH ID=  2140000        0
     1. BGGM 1        8227   4.00000      0.0          0.0          4.00000      400.000      400.000

IC1= 2140000,  ID2=       0,  ID3= -1
TABLE NO.  2140000        0   070010    6 RED GROUP 14                          9- 1-73
 ROW  SEQ. ITEM           TYPE    1.QTY        2.RANGE      3.D-BRNG     4.VALUE      5.VCRUSE     6.VMAX

   1    1. BGGM 1         8227   4.00000      0.0          0.0          4.00000      400.000      400.000

   2    2. BGGJ 1         8243   1.00000      0.0          0.0          3.00000      400.000      400.000

        INTEGER      CONSTANT                  0                         0            0                      0
        REAL         CONSTANT 0.0                        0.0                       0.0          0.0

ZIP 11 1 2  511CCCCC   -1    0    0    0 UPDATE. [redacted] RNG,ALT,VEL.

NEW LINE FOR TABLE WITH ID=  51100000      -1
    71. ASM [redacted]    7C1   402.000      150.030      5.04500      40.0000      120.086      40.0000
                                          15.0550      40.0300      10.0600      1.06C00      0.0          0.0

*      **     **     **    NEM  TEST    **     **     **     **
```

(A) (B) (C) (D) (E) (F) (G) (H) (J)

FIGURE IV-4
UPDATE ORIGINAL TABLES
0212, 0214, & 5110

FIGURE IV-5

BLU & RED GROUPS SELECTED

(U) This is a result of processing the engagement called for in Table 0100.

Item	Comment
A	No. of BLU Groups = 5
B	BLU Group Nos. are: 1, 4, 5, 8, 9
C	BLU Group Codes 1 : Group 1 is a main group 104 : Group 4 works with group 1 : 109 : Group 9 works with group 1
D E F	For RED Groups

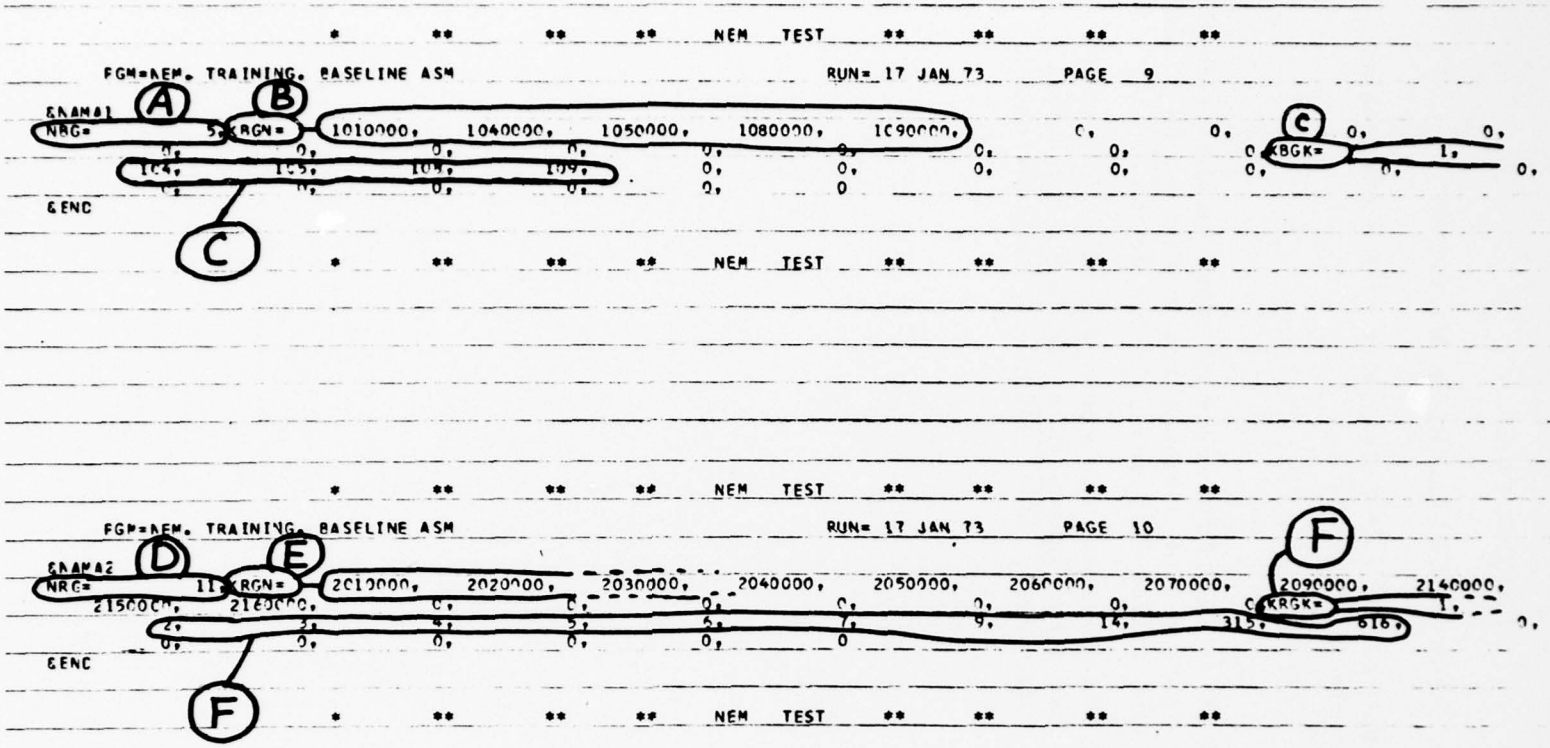


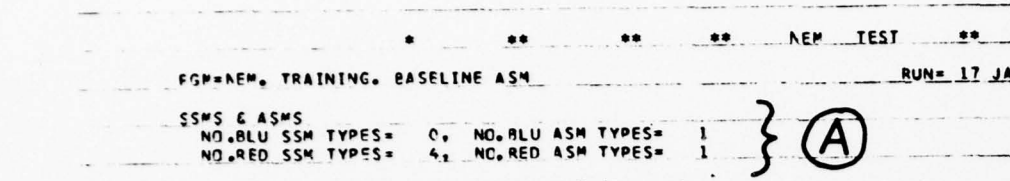
FIGURE IV-5
BLU & RED GROUPS SELECTED

FIGURE IV-6

SSM, ASM, AND MISCELLANEOUS WEAPONS

(U) This is a result of the ZIP-8-0-1 setup of the engagement. Brief data on specific systems shown.

Item	Comment
A	Numbers of BLU & RED SSM and ASM types called for in this engagement. Specific type numbers are in Figures IV-8 and IV-9. See Basic Tables 7810 and 9810 for details.
B	Brief data on Miscellaneous weapon types called for in this engagement. See also Figures IV-8 and IV-9, and Basic Tables 7200, 7300, 7400, 9200, 9300, and 9400 for details.



```
*     **     **     **    NEM  TEST    **     **     **     **

PGM=NEM. TRAINING. BASELINE ASM                    RUN= 17 JAN 73    PAGE 11

SSMS & ASMS
  NO.BLU SSM TYPES=   0.  NO.BLU ASM TYPES=   1
  NO.RED SSM TYPES=   4.  NO.RED ASM TYPES=   1

AT END OF SETUPC, CUM NO. SETUP ERRORS=NFLAG=   0

*     **     **     **    NEM  TEST    **     **     **     **

*     **     **     **    NEM  TEST    **     **     **     **

PGM=NEM. TRAINING. BASELINE ASM                    RUN= 17 JAN 73    PAGE 12

MISC. WEAPON DATA
  SYSTEM
  NAME AND TYPE          MAX RANGE   VELOCITY   WHD WT
                           NM          KTS        LBS
1.MK-[redacted]  72120000  0.50000     30.000     75.000   TORPEDO
2.MK-[redacted]  72130000  1.0000      30.000     54.000   TORPEDO
3.ASW-PROJ       73120000  0.50000     400.00     34.000   ASW
4.[redacted]     74110000  5.0000      600.00     75.000   ASW
5.[redacted]     75120000  5.0000      600.00     25.000   AAM
6.[redacted]     92110000  6.0000      30.000     600.00   TORPEDO
7.[redacted]     93110000  30.000      50.000     300.00   ASW
8.[redacted]     93160000  1.5000      400.00     60.000   ASW
9.MBL[redacted]  93170000  2.5000      400.00     120.00   ASW

*     **     **     **    NEM  TEST    **     **     **     **
```

FIGURE IV-6
SSM, ASM, AND MISCELLANEOUS WEAPONS

FIGURE IV-7

GUNS, SAMS, AND HOMING RADARS

(U) This is a result of the ZIP-8-0-1 setup of the engagement. Brief data on specific systems shown.

Item	Comment
A	Numbers of BLU & RED Surface-to-air guns and missile types called for in this engagement. Brief data. See also Figures IV-8 and IV-9 and Basic Tables 7510, 7710, 9510, and 9710 for details.
B	Numbers of BLU & RED Cruise Missile Homing Radars. See Basic Tables 6710 and 8710 for details.

FIGURE IV-7
GUNS, SAMS, AND HOMING RADARS

* ** ** ** NEM TEST ** ** ** **

PGM=NEM. TRAINING. BASELINE ASM   RUN= 17 JAN 73   PAGE 13

AAGUNS & SAMS
NO.BLU GUN TYPES= 2, NO.BLU SAM TYPES= 3
NO.RED GUN TYPES= 2, NO.RED SAM TYPES= 2

(A)

	SYSTEM NAME AND TYPE		MIN RANGE NM	MAX RANGE NM	MIN ELEV DEG	MAX ELEV DEG	MAX ALT KFT	MAX HORIZ. NM
GUN	1. [redacted]	75110000	0.50000	2.5200	0.0	90.000	14.000	2.5200
GUN	2. [redacted]	75130000	0.50000	3.0000	0.0	90.000	18.000	3.0000
SAM	3. [redacted]	77110000	2.0000	17.500	0.0	60.000	65.000	17.500
SAM	4. [redacted]	77120000	4.5000	40.000	0.0	45.000	80.000	40.000
SAM	5. [redacted]	77140000	1.0000	6.0000	0.0	80.000	12.000	6.0000
GUN	6. [redacted]	95170000	0.50000	2.5200	0.0	90.000	14.000	2.5200
GUN	7. [redacted]	95190000	0.50000	3.0000	0.0	90.000	18.000	3.0000
SAM	8. [redacted]	97110000	3.0000	13.000	0.0	45.000	60.000	13.000
SAM	9. [redacted]	97130000	5.0000	27.000	0.0	45.000	80.000	20.000

AT END OF SETUPD,CUM NO. SETUP ERRORS=NFLAG= 0

* ** ** ** NEM TEST ** ** ** **

* ** ** ** NEM TEST ** ** ** **

PGM=NEM. TRAINING. BASELINE ASM   RUN= 17 JAN 73   PAGE 14

NO.OF CRUISE MISSILE HOMING RADAR TYPES= 4

(B)

1.MHF AS[redacted] 87420000 HOMING RADAR DATA

2.MHRSS[redacted] 87450000 HOMING RADAR DATA

3.MHRSS-[redacted] 87460000 HOMING RADAR DATA

4.MHFSS[redacted] 87480000 HOMING RADAR DATA

AT END OF SETUPF, CUM NO. SETUP ERRORS=NFLAG= 0

* ** ** ** NEM TEST ** ** ** **

FIGURE IV-8

BLU PLATFORMS VS SYSTEMS

(U) This is a result of the ZIP-8-0-1 setup of the engagement. Platform types (ships, aircraft, submarines) are the column headings across the top, e.g. CVA type 6113, DD type 6153, etc.

(U) System name and types are in the column at the left. The first four digits of the type code are the type number, e.g. 62120000 means fighter aircraft type 6212, 65140001 means search radar type 6514, etc. The last four digits are coded pointers used by the program to find related data. An item is in the system list if and only if it is on some platform called for in this specific engagement.

(U) A non-zero entry in the body of the table means that system type is on that platform type.

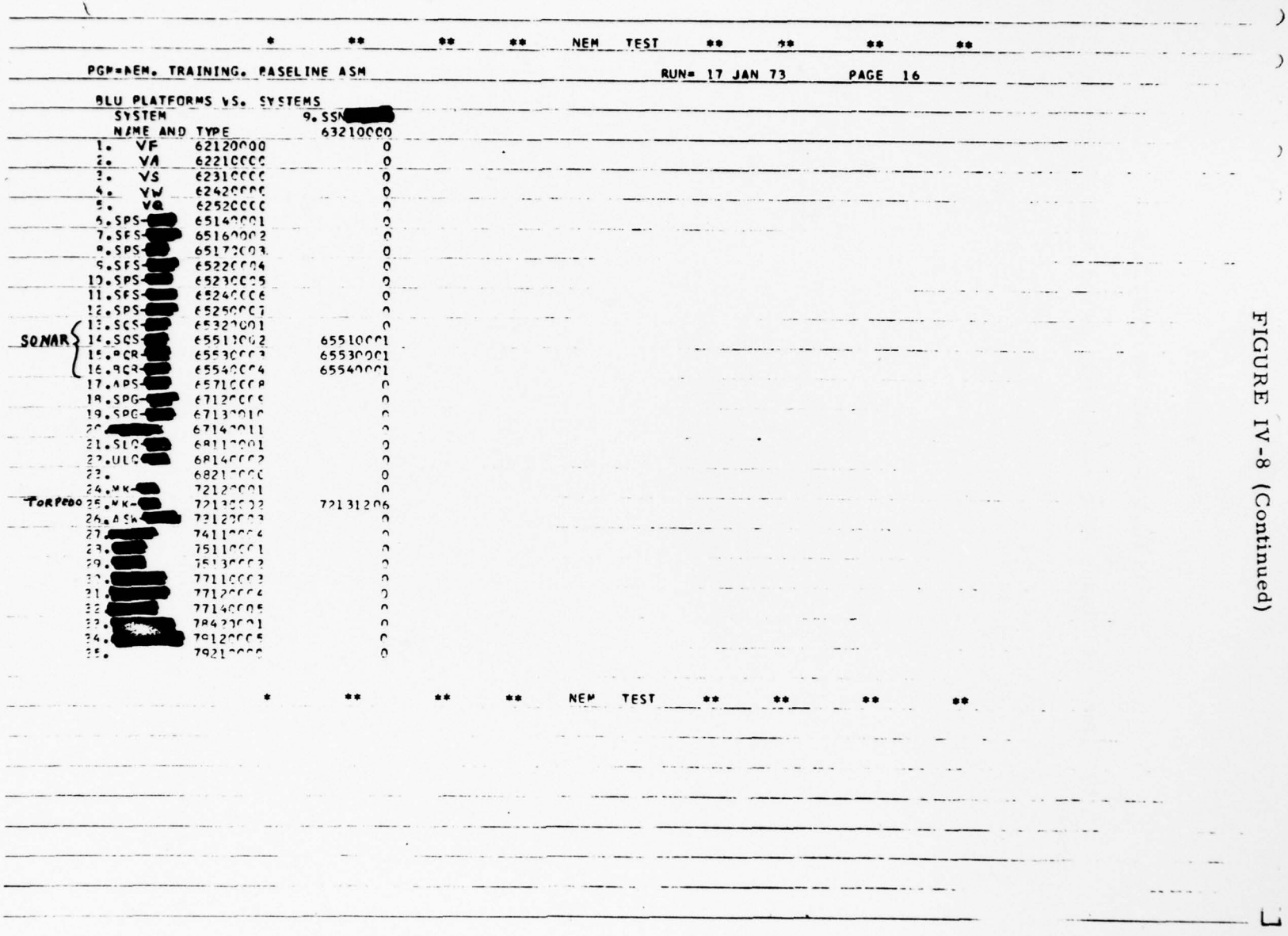
FIGURE IV-8
BLU PLATFORMS VS SYSTEMS

FGP-NEW, TRAINING, BASELINE ASM — RUN= 17 JAN 73 — PAGE 15

BLU PLATFORMS VS. SYSTEMS

	SYSTEM NAME AND TYPE	1.CVA	2.DD	3.DDG	4.DLG	5.VF-2	6.VA-1	7.VW-2	8.VO-2
1.	VF 62120000	61130000	61530000	61540000	61550000	62120000	62210000	62420000	62520000
		62120124	0	0	0	0	0	0	0
2.	VA 62210000	62210142	0	0	0	0	0	0	0
3.	VS 62310000	62310104	0	0	0	0	0	0	0
4.	VW 62420000	62420104	0	0	0	0	0	0	0
5.	VO 62520000	62520105	0	0	0	0	0	0	0
6.	SPS 65140001	65140001	65140001	65140001	65140001	0	0	0	0
7.	SPS 65160002	0	65160001	65160001	0	0	0	0	0
8.	SPS 65170003	65170001	0	0	0	0	0	0	0
9.	SPS 65220004	0	0	65220001	0	0	0	0	0
10.	SPS 65230005	0	65230001	65230001	0	0	0	0	0
11.	SPS 65240006	65240001	0	0	65240001	0	0	0	0
12.	SPS 65250007	0	0	0	65250001	0	0	0	0
13.	SQS 65320001	0	65320001	65320001	65320001	0	0	0	0
14.	SCS 65510002	0	0	0	0	2	0	0	0
15.	PCR 65530003	0	0	0	0	0	0	0	0
16.	PCR 65540004	0	0	0	0	0	0	0	0
17.	APS 65710008	0	0	0	0	0	0	65710001	0
18.	SPG 67120005	0	0	67120002	0	2	0	0	0
19.	SPG 67130010	0	0	0	67130004	2	0	0	0
20.	67140002	67140002	0	0	0	0	0	0	0
21.	SLQ 68110001	68110001	0	0	0	0	0	0	0
22.	ULQ 68140002	0	68140001	68140001	68140001	0	0	0	0
23.	68210000	68210001	0	0	0	0	0	0	0
24.	MK 72120002	0	72120402	72121206	72121206	2	0	0	0
25.	MK 72130003	0	0	0	0	0	0	0	0
26.	ASW 73129902	0	73129902	0	0	0	0	0	0
27.	74110004	0	74110801	74110801	74110801	0	0	0	0
28.	75119001	0	75119902	75139902	75119902	0	0	0	0
29.	75130002	0	75139903	75139902	0	0	0	0	0
30.	GUN 77110003	0	0	77114202	0	0	0	0	0
31.	77120004	0	0	0	77126002	0	0	0	0
32.	77140005	77140802	0	0	0	0	0	0	0
33.	ASM 78420001	0	0	0	0	0	78420204	0	0
34.	AAM 79120002	0	0	0	0	0	0	0	0
35.	GUN 79210000	0	0	0	0	0	0	0	0

(Reverse side blank)



* ** ** ** NEM TEST ** ** ** **

PGM=NEM. TRAINING. BASELINE ASM RUN= 17 JAN 73 PAGE 16

BLU PLATFORMS VS. SYSTEMS

	SYSTEM NAME AND TYPE		9.SSN[redacted] 63210000
	1. VF	62120000	0
	2. VA	62210000	0
	3. VS	62310000	0
	4. VW	62420000	0
	5. VQ	62520000	0
	6.SPS-[redacted]	65140001	0
	7.SFS-[redacted]	65160002	0
	8.SPS-[redacted]	65170003	0
	9.SFS-[redacted]	65220004	0
	10.SPS-[redacted]	65230005	0
	11.SFS-[redacted]	65240006	0
	12.SPS-[redacted]	65250007	0
	13.SQS-[redacted]	65320001	0
SONAR	14.SQS-[redacted]	65510002	65510001
SONAR	15.BQR-[redacted]	65530003	65530001
SONAR	16.BQR-[redacted]	65540004	65540001
	17.APS-[redacted]	65710008	0
	18.SPG-[redacted]	67120009	0
	19.SPG-[redacted]	67130010	0
	20.[redacted]	67140011	0
	21.SLQ-[redacted]	68110001	0
	22.ULQ-[redacted]	68140002	0
	23.	68210000	0
	24.MK-[redacted]	72120001	0
TORPEDO	25.MK-[redacted]	72130003	72131206
	26.ASW-[redacted]	73120003	0
	27.[redacted]	74110004	0
	28.[redacted]	75110001	0
	29.[redacted]	75130002	0
	30.[redacted]	77110003	0
	31.[redacted]	77120004	0
	32.[redacted]	77140005	0
	33.[redacted]	78422001	0
	34.[redacted]	79120006	0
	35.	79210000	0

* ** ** ** NEM TEST ** ** ** **

FIGURE IV-8 (Continued)

FIGURE IV-9

RED PLATFORMS VS SYSTEMS

(U) Same as Figure IV-8 except this is for RED Platforms and Systems.

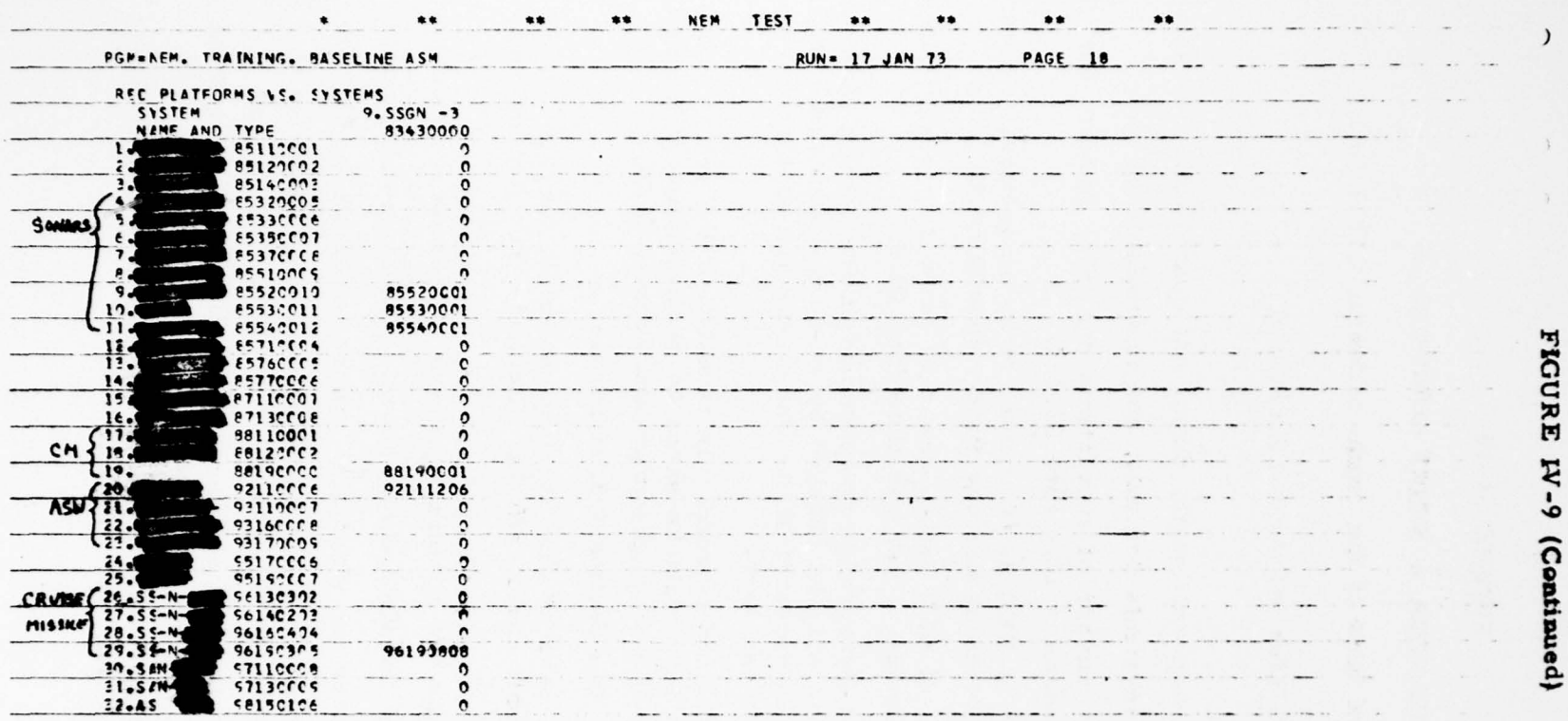
FIGURE IV-9
RED PLATFORMS VS SYSTEMS

PGM=NEM. TRAINING. BASELINE ASW — RUN= 17 JAN 73 — PAGE 17

REC PLATFORMS VS. SYSTEMS

	SYSTEM NAME AND TYPE	1.CLGM -1	2.CLGM -3	3.DLG -1	4.BGGM 2-5	5.BEBJ	6.BEDGEK-3	7.BGGJ	8.SSGN -1
		81350000	81370000	81540000	82270000	82410000	82420000	82430000	83410000
1.	[redacted]	0	85110001	0	0	0	0	0	0
SHIPS 2.	[redacted]	95120001	85120001	85120001	0	0	0	0	0
SEARCH 3.	[redacted]	0	0	85140001	0	0	0	0	0
RADARS 4.	[redacted]	95320001	0	0	0	0	0	0	0
5.	[redacted]	85330001	0	85330001	0	0	0	0	0
6.	[redacted]	85330001	0	85350001	0	0	0	0	0
SONARS 7.	[redacted]	0	85370001	0	0	0	0	0	0
8.	[redacted]	0	0	0	0	0	0	0	85510001
9.	[redacted]	0	0	0	0	0	0	0	0
10.	[redacted]	0	0	0	0	0	0	0	0
11.	[redacted]	0	0	0	0	0	0	0	0
A/C 12.	[redacted]	0	0	0	0	85710001	0	0	0
SENSOR 13.	[redacted]	0	0	0	85760001	0	0	85760001	0
RADAR 14.	[redacted]	0	0	0	0	0	0	0	0
15.	[redacted]	87110001	0	87110001	0	0	85770001	0	0
F/C 16.	[redacted]	0	87130001	0	0	0	0	0	0
RDAR 17.	[redacted]	0	0	0	0	88110001	0	88110001	0
18.	[redacted]	0	0	0	0	98120001	0	88120001	0
CM 19.	[redacted]	0	0	0	0	0	0	0	88190001
20.	[redacted]	92111206	92112010	92111005	0	0	0	0	92111206
ASW 21.	[redacted]	93110101	93110101	93110101	0	0	0	0	0
22.	[redacted]	93169902	93169902	93169902	0	0	0	0	0
23.	[redacted]	0	93179901	93179901	0	0	0	0	0
GUN 24.	[redacted]	95179904	0	95179904	0	0	0	0	0
25.	[redacted]	0	95199904	0	0	0	0	0	0
CRUISE 26. SS-N-	[redacted]	96131608	0	0	0	0	0	0	0
27. SS-N-	[redacted]	0	0	0	0	0	0	0	96140808
MISSILE 28. SS-N-	[redacted]	0	96160808	0	0	0	0	0	0
29. SS-N-	[redacted]	0	0	0	0	0	0	0	0
SAM 30. SAN	[redacted]	97112401	0	97114902	0	0	0	0	0
31. SAN	[redacted]	0	97134802	0	0	0	0	0	0
ASM 32. AS	[redacted]	0	0	0	98150202	0	0	0	0

(Reverse side blank)



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*      **      **      **    NEM  TEST    **      **      **      **

PGM=NEM. TRAINING. BASELINE ASM                    RUN= 17 JAN 73     PAGE 18

REC PLATFORMS VS. SYSTEMS
   SYSTEM                    9.SSGN -3
   NAME AND TYPE            83430000
 1.[redacted]  85110001             0
 2.[redacted]  85120002             0
 3.[redacted]  85140003             0
 4.[redacted]  85320005             0
 5.[redacted]  85330006             0
 6.[redacted]  85350007             0
 7.[redacted]  85370008             0
 8.[redacted]  85510005             0
 9.[redacted]  85520010      85520C01
10.[redacted]  85530011      85530001
11.[redacted]  85540012      85540C01
12.[redacted]  85710004             0
13.[redacted]  85760005             0
14.[redacted]  85770006             0
15.[redacted]  87110001             0
16.[redacted]  87130008             0
17.[redacted]  98110001             0
18.[redacted]  88120002             0
19.            88190000      88190001
20.[redacted]  92110006      92111206
21.[redacted]  93110007             0
22.[redacted]  93160008             0
23.[redacted]  93170009             0
24.[redacted]  95170006             0
25.            95190007             0
26.SS-N-[redacted]  96130302        0
27.SS-N-[redacted]  96140203        0
28.SS-N-[redacted]  96160404        0
29.SS-N-[redacted]  96190305 96193808
30.SAN[redacted]  97110008          0
31.SAN[redacted]  97130005          0
32.AS[redacted]  98150106           0

AT END OF SETUPS, CUM NO. SETUP ERRORS=NFLAG=    0

*      **      **      **    NEM  TEST    **      **      **      **
```

Sonars

CM

ASW

CRUISE MISSILE

FIGURE IV-9 (Continued)

FIGURE IV-10

SIMULATOR & PRINT CONTROL

(U) This is a print back of the inputs following ZIP-9 CALL XECUTE, plus all default values.

1. NAMELIST &DIMENS (See Section 3.2 for inputs)

Items	Comments
LENSEG	Information segment length, fixed, not controllable by user.
NSEGPU	Number of segments per unit, not controllable by user.
NSYSPU	The average number of subsystems per unit. Affects use of storage. Default = 10. (See III. 3.2)
MAXRTU	Max number of RED units allowed to be on temporary (intercept) trajectories at any one time. (See III. 3.2)
MAXBTU	Max number of BLU units allowed to be on temporary (intercept) trajectories at any one time (See III. 3.2)
LDIMEN	Number of 4-Byte words programmed in for use by dynamic storage. Can only be changed by re-compilation and Link edit. This is repeated at the end of the run to show the maximum amount used.
KSAVE	This is initialized to zero. Is repeated at the end to show the K-Bytes that could be saved by recompilation if desired. Varies with size of engagement and activity level.

2 NAMELIST &NGAGE (See Section 3.3 for inputs)

NCARLØ	Number of "passes" thru the engagement to average out the random "monte carlo" efforts. Default = 1. Recommend multiples of 3.
TBEGIN	Time to begin the simulation, hours. Earliest = -10.0 hours
TIMEND	Time to end the simulation, hours. Latest = +5.0 hours.
TSTEP	Time step size for simulation, hours. Default = .001 hours.
NRANDM	The number of times the random number generator is to be called to initialize it. Default = 1.
IPRINT	Print option for unit position and status during engagement. No Print = 0, Print = 1, Default = 0.
ISNAPR	Snapshot Print level. No print = 0, Position and status of units = 1, Debug = 2. Default = 0.

FIGURE IV-10
SIMULATOR & PRINT CONTROL

```
            *          **          **          ** NEW=S72BBIGH TEST  **          **          **          **

      NEW ENCAG.47405.(SY4,MEU=1-CV,1-CG,2-KNEAR,4-EG) A6=70. V3=1728.  H=61  1-27-75        PAGE  57

&DIMENS
LENSEC=          8,NSEGPU=          27,NSYSPU=          14,MAXPTU=          75,MAXOTU=          50,LDIMEN=     15000,KSAVE=          0,
NPHASE=          0
&END

            *          **          **          ** NEW=S72BBIGH TEST  **          **          **          **

            *          **          **          ** NEW=S72BBIGH TEST  **          **          **          **

      NEW ENCAG.47405.(SY4,MEU=1-CV,1-CG,2-KNEAR,4-EG) A6=70. V3=1728.  H=61  1-27-75        PAGE  58

&NGAGE
NCARLC=          1,TBEGIN= -2.3249998    ,TIMEND=  1.0000000    ,TSTEP= 0.25555558E-02,NRANDM=          1,NPHASE=          6,
IPRINT=          1,ISNAPR=          1,PRSTEP= 0.69999974E-01,PSTART=-0.49999997E-01,PSTOP= 0.39999998    ,NLPR=          1,KILLPR=
          1,PDCLAS= 0.58099995    ,HVTB=  300.00977    ,HVTF= 0.0          ,HVTIME= 0.0          ,IVECB=          0,IVECR=
          -1,IRNOVB=          0,IRNOVR=          1,IKSAM=          1,NXSHIP=          408,NXAC=          1,NXSUB=          2,NXCM=
          4,IPRAD=          -1,IENV=          4,JAM=          0,ISCAN=          3,PCTIME= 0.20099958E-01,PUMIN= 0.79999995    ,
PDTMIN= 0.50000000    ,PDCMIN= 0.50000000    ,IACTIV=          0,IPOTTM=          1,AIRCPT= 0.33332998    ,IMISC=          20,
          0,          1,          0,          1,          50,          1,          0,          300,          0,          0,          1,
          0,          1,          0,          0,          0,          0,          200,          0,          98,          0,          0,
          0,          0,          0,          0,          0,          1,          0,          408,          1,          2,          4,
          0,NBATT=          7,MISRAD=          6711,          7713,          6712,          7711,          6713,          7712,          6714,
     7714,          8711,          9711,          8713,          9713,          8712,          9712,  443767024, -682330105, -268406784, -750249867,
  1545849023,  443774583,NTIMES=          13,TIMES= -10.000000    , -6.0000000    , -3.0000000    , -2.4999981    , -2.0000000    ,
  -1.0000000    ,-0.75000000    ,-0.49999994    ,-0.24999994    ,-0.99999964E-01, 0.0          , 0.25000000    , 5.0000000    ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          ,
  0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0          , 0.0
&END

            *          **          **          ** NEW=S72BBIGH TEST  **          **          **          **
```

FIGURE IV-10 (Cont)

Item	Comment
PRSTEP	Print frequency, hours, when IPRINT is on. Default = 0.1 hours.
PSTART	Print interval start time, hours, if IPRINT is on. Default = -100 hours.
PSTOP	Print interval stop time, hours, if IPRINT is on. Default = +100 hours.
NLPR	Debug and check-out print option during simulation. Print = 1, No Print = 0. Default = 0.
KILLPR	Print option for KILLEX evaluation of kills. No Print = 0, First level = 1, Second level = 2. Default = 0.
IPRAD	Radar model option flag. If = -1 use dummy radars. If = 0, use actual radars. Default = 0.
IENV	Sea state for radar environment. Default = 4.
JAM	Radar jammers. All Off = 0, All On = 1, Default = 0.
ISCAN	No. of scans made by a search radar in computing prob. of detection. Maximum = 9. Default = 3.
PDTIME	Maximum time, hours, that a computed detection probability can be used without recheck. Default = .02 hours.
PDMIN	Minimum threshold probability of detection for search radars. Default = 0.5.
PDTMIN	Minimum threshold probability of detection for SAM. Acquisition and track radars. Default = 0.5.
PDCMIN	Minimum threshold probability of detection for cruise missile homing radars. Default = 0.5.
IACTIV	Active or passive mode for sonar. Passive = 0, Active = 1. Default = 0.
IBOTTM	Bottom bounce or direct path for sonar. Bottom Bounce = 1, Direct = 0, Default = 1.
AIRCPT	Max aircraft interceptor fly out time, hours, allowed (one way). Default = 1 hour.
IMISC (3)	= NLPR, see above.
IMISC (5)	= KILLPR, see above.
IMISC (7)	= ISNAPR, see above.

FIGURE IV-10 (Cont)

Item	Comments
NXSHIP	Max. no. of units allowed to simultaneously attack a ship target. Default = 5. EXCEPTION: The no. of cruise missiles per ship is not limited.
NXAC	Max. no. of units allowed to simultaneously attack an aircraft target on normal routes. Default = 2.
NXSUB	Max. no. of units allowed to simultaneously attack a submarine target. Default = 2.
NXCM	Max. no. of units allowed to simultaneously attack a cruise missile or aircraft on an intercept trajectory. Default = 1.
NBATT	The number of SAM battery (radar and missile) combinations defined in the array MISRAD. Max = 10, Default = 7.
MISRAD (2, 10)	Input array of SAM battery combinations. First number = radar type, Second number = missile type. Default pairs are: 6711, 7713 6712, 7711 6713, 7712 6714, 7714 8711, 9711 8713, 9713 8712, 9712
NTIMES	Number of entries in array TIMES.
TIMES (100)	Time in hours of all distinct "nodes" in the planned routes for the BLU and RED groups. The time steps include all these points.

FIGURE IV-11

BLU UNIT SNAPSHOT

(U) During setup and at time intervals defined by PRSTEP, if IPRINT = 1, BLU units on planned routes are printed out showing status and position, as follows:

Item	Comment
A	Sequential BLU unit number in this specific engagement.
B	Unit name, from BLU Group Tables 0101, 0102, etc.
C	A code showing side, group and unit number in the group as defined in Tables 0100, 0101, 0102, etc., e.g. 1090200 means BLU, Group 9, Unit 2 Note: This group number differs from that in E.
D	Type code of platform (unit) in system catalog.
E	A sequential group number in this specific engagement.
F	Unit status: =0, Killed, removed from game at time shown in G. =1, Alive, undetected. =-1, Off station, on a temporary route, no replacement unit yet. =2, Detected, not under attack. =N, N greater than 2 implies unit is detected and under attack by N-2 attackers. =MON, N = same as above. M = KSTATE reflecting the degree of partial damage for ship and submarine units.
G	Time in hours, decimal, minutes. If status = 0, is time unit was killed, otherwise is current position.
I	Z coordinate (altitude) in thousands of feet. If status = 0, is position where unit was killed, otherwise is current.
J, K, L	Heading, degrees; Velocity, knots; rate of altitude change, thousands of feet per minute. If status = 0, conditions at time of kill, otherwise is current.
M	Time, hours. Same as G.

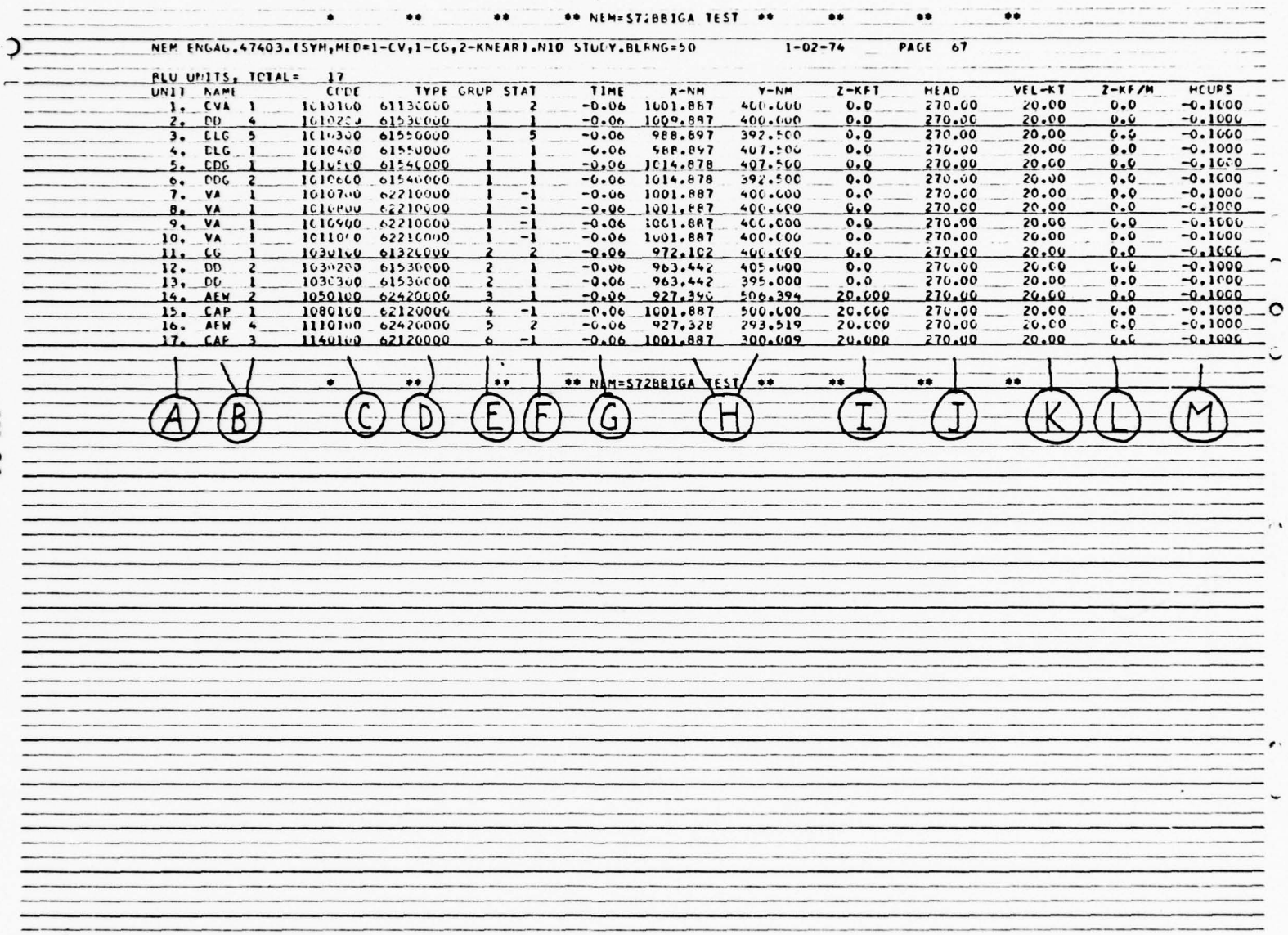
** NEM=S72BBIGA TEST **
NEM ENGAG.47403.(SYM,MED=1-CV,1-CG,2-KNEAR).N10 STUDY.BLANG=50 1-02-74 PAGE 67
BLU UNITS, TOTAL= 17
UNIT NAME CODE TYPE GRUP STAT TIME X-NM Y-NM Z-KFT HEAD VEL-KT Z-KF/M HCURS
1. CVA 1 1010100 61130000 1 2 -0.06 1001.887 400.000 0.0 270.00 20.00 0.0 -0.1000
2. DD 4 1010200 61530000 1 1 -0.06 1009.897 400.000 0.0 270.00 20.00 0.0 -0.1000
3. DLG 5 1010300 61550000 1 5 -0.06 988.897 392.500 0.0 270.00 20.00 0.0 -0.1000
4. DLG 1 1010400 61550000 1 1 -0.06 988.897 407.500 0.0 270.00 20.00 0.0 -0.1000
5. CDG 1 1010500 61540000 1 1 -0.06 1014.878 407.500 0.0 270.00 20.00 0.0 -0.1000
6. DDG 2 1010600 61540000 1 1 -0.06 1014.878 392.500 0.0 270.00 20.00 0.0 -0.1000
7. VA 1 1010700 62210000 1 -1 -0.06 1001.887 400.000 0.0 270.00 20.00 0.0 -0.1000
8. VA 1 1010800 62210000 1 -1 -0.06 1001.887 400.000 0.0 270.00 20.00 0.0 -0.1000
9. VA 1 1010900 62210000 1 -1 -0.06 1001.887 400.000 0.0 270.00 20.00 0.0 -0.1000
10. VA 1 1011000 62210000 1 -1 -0.06 1001.887 400.000 0.0 270.00 20.00 0.0 -0.1000
11. CG 1 1030100 61320000 2 2 -0.06 972.102 400.000 0.0 270.00 20.00 0.0 -0.1000
12. DD 2 1030200 61530000 2 1 -0.06 963.442 405.000 0.0 270.00 20.00 0.0 -0.1000
13. DD 1 1030300 61530000 2 1 -0.06 963.442 395.000 0.0 270.00 20.00 0.0 -0.1000
14. AEW 2 1050100 62420000 3 1 -0.06 927.396 506.394 20.000 270.00 20.00 0.0 -0.1000
15. CAP 1 1080100 62120000 4 -1 -0.06 1001.887 500.000 20.000 270.00 20.00 0.0 -0.1000
16. AEW 4 1110100 62420000 5 2 -0.06 927.328 293.519 20.000 270.00 20.00 0.0 -0.1000
17. CAP 3 1140100 62120000 6 -1 -0.06 1001.887 300.009 20.000 270.00 20.00 0.0 -0.1000
** NEM=S72BBIGA TEST **
A
B
C
D
E
F
G
H
I
J
K
L
M

FIGURE IV-11

FIGURE IV-12

RED UNIT SNAPSHOT

(U) This is the same as Figure IV-11 except it is for RED units.

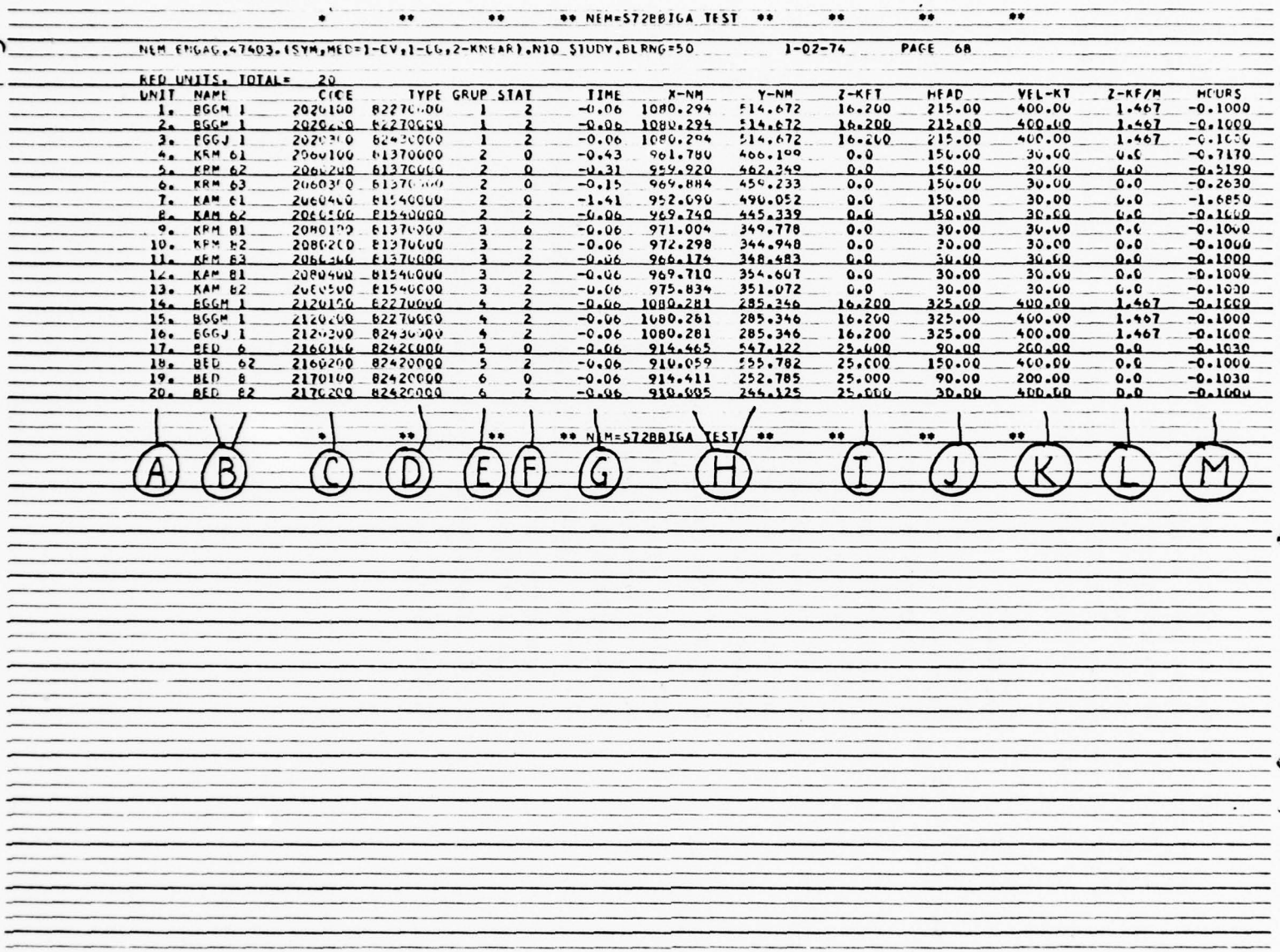
** NEM=S72BBIGA TEST ** ** ** ** **
NEM ENGAG,47403.(SYM,MED=1-CV,1-CG,2-KNEAR),N10 STUDY.BLRNG=50 1-02-74 PAGE 68
RED UNITS, TOTAL= 20
UNIT NAME CICE TYPE GRUP STAT TIME X-NM Y-NM Z-KFT HEAD VEL-KT Z-KF/M HOURS
1. BGGM 1 2020100 82270000 1 2 -0.06 1080.294 514.672 16.200 215.00 400.00 1.467 -0.1000
2. BGGM 1 2020200 82270000 1 2 -0.06 1080.294 514.672 16.200 215.00 400.00 1.467 -0.1000
3. BGGJ 1 2020300 82420000 1 2 -0.06 1080.294 514.672 16.200 215.00 400.00 1.467 -0.1000
4. KRM 61 2060100 81370000 2 0 -0.43 961.780 466.199 0.0 150.00 30.00 0.0 -0.7170
5. KRM 62 2060200 81370000 2 0 -0.31 959.920 462.349 0.0 150.00 30.00 0.0 -0.5190
6. KRM 63 2060300 81370000 2 0 -0.15 969.884 459.233 0.0 150.00 30.00 0.0 -0.2630
7. KAM 61 2060400 81540000 2 0 -1.41 952.090 490.052 0.0 150.00 30.00 0.0 -1.6850
8. KAM 62 2060500 81540000 2 2 -0.06 969.740 445.339 0.0 150.00 30.00 0.0 -0.1000
9. KRM 81 2080100 81370000 3 6 -0.06 971.004 349.778 0.0 30.00 30.00 0.0 -0.1000
10. KRM 82 2080200 81370000 3 2 -0.06 972.298 344.948 0.0 30.00 30.00 0.0 -0.1000
11. KRM 83 2060300 81370000 3 2 -0.06 966.174 348.483 0.0 30.00 30.00 0.0 -0.1000
12. KAM 81 2080400 81540000 3 2 -0.06 969.710 354.607 0.0 30.00 30.00 0.0 -0.1000
13. KAM 82 2060500 81540000 3 2 -0.06 975.834 351.072 0.0 30.00 30.00 0.0 -0.1030
14. BGGM 1 2120100 82270000 4 2 -0.06 1080.281 285.346 16.200 325.00 400.00 1.467 -0.1000
15. BGGM 1 2120200 82270000 4 2 -0.06 1080.281 285.346 16.200 325.00 400.00 1.467 -0.1000
16. BGGJ 1 2120300 82420000 4 2 -0.06 1080.281 285.346 16.200 325.00 400.00 1.467 -0.1000
17. BED 6 2160100 82420000 5 0 -0.06 914.465 547.122 25.000 90.00 200.00 0.0 -0.1030
18. BED 62 2160200 82420000 5 2 -0.06 910.059 555.782 25.000 150.00 400.00 0.0 -0.1000
19. BED 8 2170100 82420000 6 0 -0.06 914.411 252.785 25.000 90.00 200.00 0.0 -0.1030
20. BED 82 2170200 82420000 6 2 -0.06 910.005 244.125 25.000 30.00 400.00 0.0 -0.1000
** NEM=S72BBIGA TEST ** ** ** ** **
A
B
C
D
E
F
G
H
I
J
K
L
M

FIGURE IV-12

FIGURE IV-13

BLU TEMPORARY UNITS - SNAPSHOT

(U) Temporary Units are either aircraft diverted from a planned route; or aircraft launched from an aircraft carrier station (see unit stations 7-10 in Figure IV-11); or aircraft diverted from CAP or AEW stations (see unit stations 14-17 in Figure IV-11); or cruise missiles launched from aircraft, ships or submarines. If IPRINT = 1 and ISNAPR = 1, a snapshot of temporary units is printed at interval defined by PRSTEP, as follows:

Item	Comment
A, B, E, H, I, K, L	Same as or comparable to same items in Figure IV-11. Note A is a temporary sequence number that may be re-used after this unit originates.
N	ORIGIN. The unit sequence number (see Figure IV-11) from which the unit originated.
O	TGTU. The unit sequence number (see Figure IV-12) of the unit which is the target. TGTU=0 indicates a unit flying back to its carrier base (if any) or to its flight station origin.
P	RANGE. The current range to the target, NM.
Q	TINCEPT. Battle time at which the intercept is expected to occur. Predicted from the current velocities of the intercept unit and the target unit.
R	TVECTOR. Battle time at which the intercept unit expects to change its velocity in accordance with the velocity-altitude profile it is flying.
S	TIME. Battle time the snapshot is taken, hours.
T	SIDE. If = 1, BLUE. If = 2, RED.

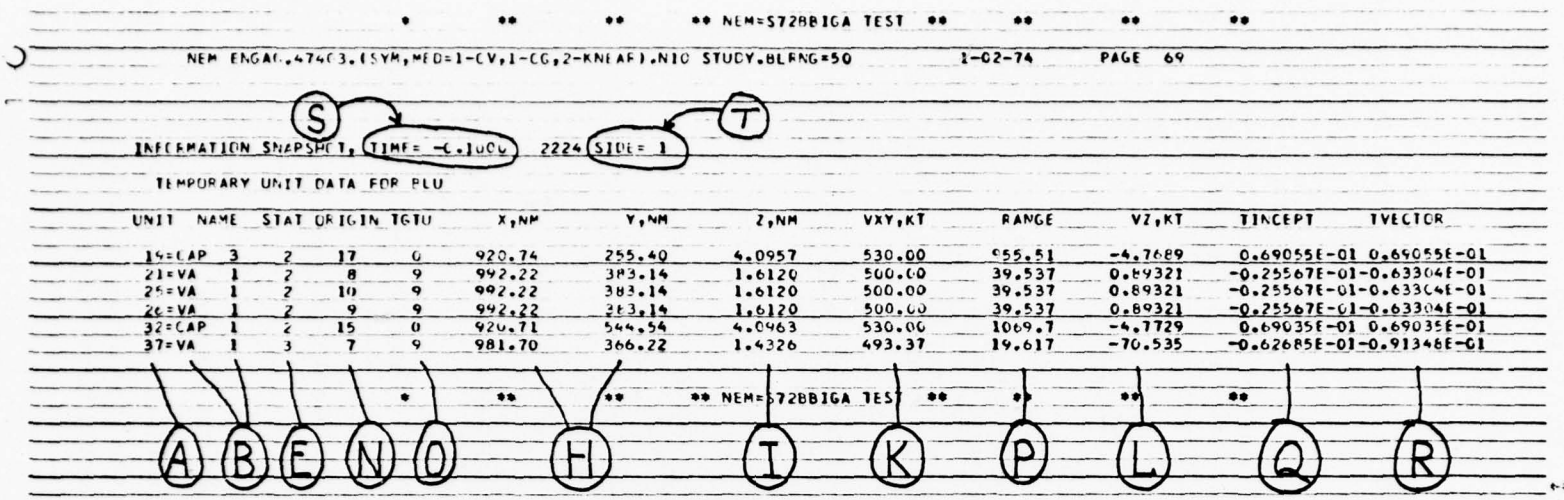
** NEM=S72BBIGA TEST **
NEM ENGAG.474C3.(SYM,MED=1-CV,1-CG,2-KNEAR).N10 STUDY.BLENG=50 1-02-74 PAGE 69
S
T
INFORMATION SNAPSHOT, TIME= -0.1000 2224 SIDE= 1
TEMPORARY UNIT DATA FOR BLU
UNIT NAME STAT ORIGIN TGTU X,NM Y,NM Z,NM VXY,KT RANGE VZ,KT TINCEPT TVECTOR
14=CAP 3 2 17 0 920.74 255.40 4.0957 530.00 955.51 -4.7689 0.69055E-01 0.69055E-01
21=VA 1 2 8 9 992.22 383.14 1.6120 500.00 39.537 0.89321 -0.25567E-01-0.63304E-01
25=VA 1 2 10 9 992.22 383.14 1.6120 500.00 39.537 0.89321 -0.25567E-01-0.63304E-01
26=VA 1 2 9 9 992.22 383.14 1.6120 500.00 39.537 0.89321 -0.25567E-01-0.63304E-01
32=CAP 1 2 15 0 920.71 544.54 4.0963 530.00 1069.7 -4.7729 0.69035E-01 0.69035E-01
37=VA 1 3 7 9 981.70 366.22 1.4326 493.37 19.617 -70.535 -0.62685E-01-0.91348E-01
** NEM=S72BBIGA TEST **
A B E N O H I K P L Q R

FIGURE IV-13

FIGURE IV-14

RED TEMPORARY UNITS - SNAPSHOT
AND
KILL EVALUATION DETAILS

(U) RED Temporary Units are shown in Item A in the same format as for BLU in Figure IV-13.

(U) Kill evaluation details between weapon and target are shown in the remaining items. If print option KILLPR=1, these print each time a weapon termination and kill evaluation occurs. The print is by NAMELIST but variables rather than lists will be defined as follows:

Item	Comment
TIME	Battle time, hours
JSIDE	Side to which the weapon belongs. If = 1, BLUE. If = 2, RED.
KWEAP	System Number in Platform versus System Table shown in Figures IV-8 or IV-9.
KWEPT	Four digit version of Weapon Type number as shown in Figures IV-8 or IV-9.
KWUNI	Unit (Platform) which launched the weapon as shown in Figures IV-11 or IV-12.
KWUTYP	Unit type number as shown in Figures IV-11 or IV-12.
XRN	Uniform random number on interval (0, 1). A kill is credited if XRN is less than PK.
PHIT	Probability of hit.
PCAP	Probability of capture. For homing weapons only. Is set = -2 for all others.
PK	Probability of kill. Includes effect of PHIT, PCAP (if applicable), reliability, and salvo size.
VWK	Cumulative value killed by this weapon type against various targets.
VUK	Cumulative value killed by all weapon types launched from this unit against various targets.
KTARG	Target system number in Platform versus System Tables as shown in Figures IV-8 or IV-9, unless the target is a platform. Then it is the same as KTGTU (see below).

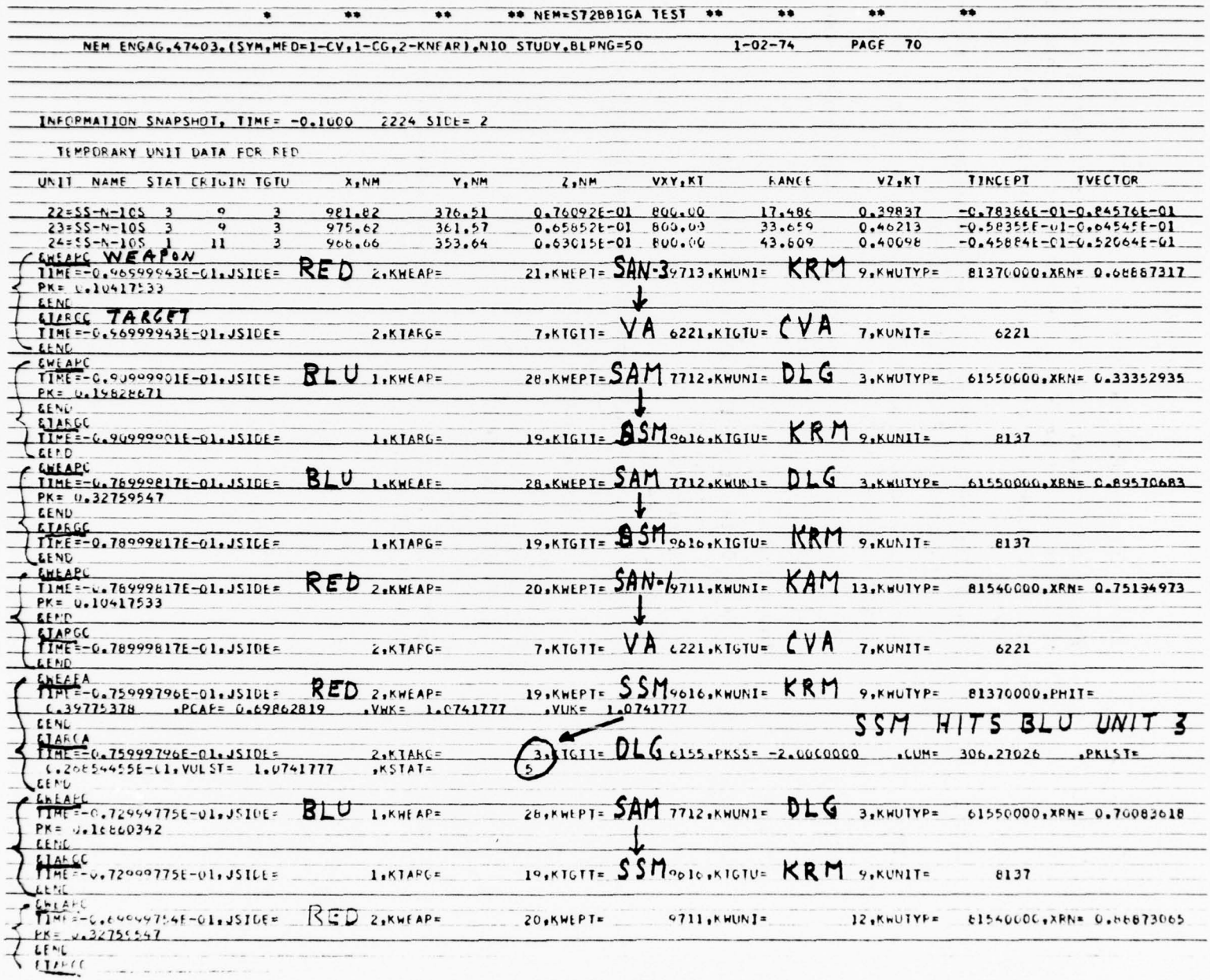

FIGURE IV - 14
RED TEMPORARY UNITS - SNAPSHOT
&
KILL EVALUATION DETAILS

FIGURE IV-14 (CONTINUED)

Item	Comment
KTGTT	Target type number as shown in Figures IV-11 or IV-12.
KTGTU	Target unit number if the target is a permanent unit as in Figures IV-11 or IV-12, or the unit which launched the target if target is a cruise missile or aircraft on a temporary route.
KUNIT	Target Unit type if target is a permanent unit, otherwise the unit type which launched the target.
CUM	Cumulative number pounds of HE delivered on a ship target (expected value).
PKLST	The probability of kill corresponding to CUM on the particular ship vulnerability curve.
VULST	Value lost.
KSTAT	Target State after kill evaluation for Ships: = 5, undamaged = 4, radars out = 3, & SAMS out = 2, & guns out, & unable to launch aircraft or cruise missiles = 1, all weapons out = 0, sunk For other targets: = 1, undamaged = 0, killed
NULST	Cumulative number of Cruise Missiles Killed by type shown for KTGTT.

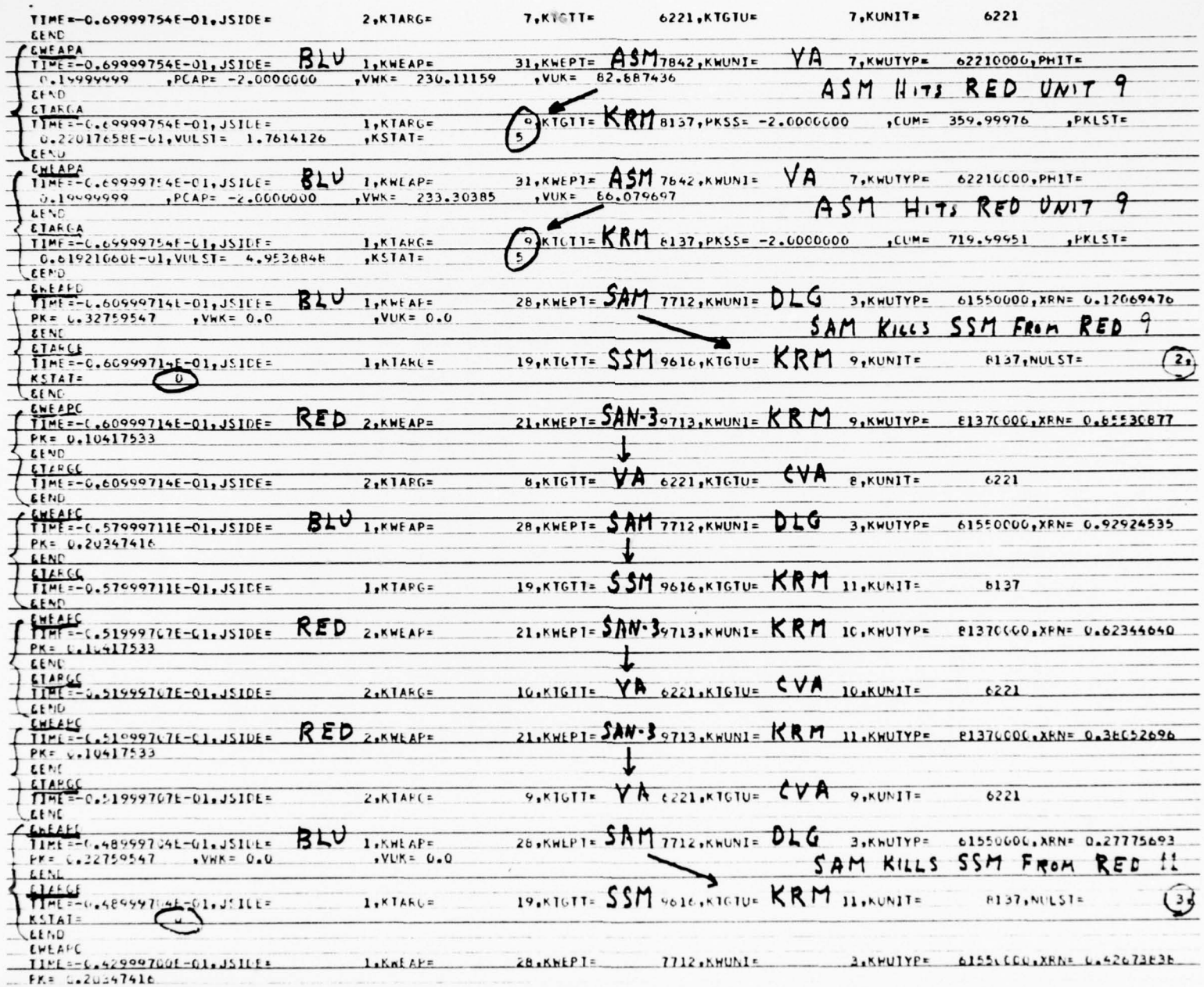

FIGURE IV - 14 (Continued)

FIGURE IV-15

SUMMARY BY UNITS

(U) At the end of each randomized (Monte Carlo) pass, a BLU summary and a RED summary is made for that pass and then averaged in with previous passes. The input variable NCARLO (see Figure IV-10) sets the number of passes.

(U) Each BLU and RED summary contains the same units as in the snapshots in Figure IV-11 and IV-12, and items as follows:

Item	Comment
A	Unit sequence number.
B	Unit name, from Group Tables 0101, 0201, etc.
C	Unit type code.
D	A sequential group number in this specific engagement.
E	Unit status: =0, Killed, remove from game. =1, Alive, undetected, not under attack. =-1, Off station, e.g. a CAP station not replenished, or a Bomber headed for rendevouz. =2, detected. =N, N greater than 2 implies unit is detected and under attack by N-2 attackers.
F	Probability of Kill (ships and submarines only). The PK associated with the cumulative HE weight of hits.
G	EHE-LBS (ships and submarines only) The cumulative weight of HE to hit the ship. This is an expected value taking into account reliability and probability of hit for each hit.
H	Value Lost, if the unit has been killed. For ships and submarines it is an expected value, see item G above.
I	Value Killed by weapons from the unit.
J	Same as G, except is the current average.
K	Same as H, except is the current average.
L	Same as I, except is the current average.
M	Total value lost on this randomized pass.
N	Randomized (Monte Carlo) pass number.
O	Average value lost on all passes.

* ** ** ** NEM TEST ** ** ** **

PGM=NEM. TRAINING. BASELINE ASM RUN= 17 JAN 73 PAGE 81

SEATIDE - NAVAL ENGAGEMENT MODEL - SUMMARY AFTER RANDOMIZED PASS NO.= 1 N

BLU SUMMARY BY UNITS

UNIT	NAME		TYPE	GRUP	STAT	PK	EHE-LBS	VALU LOST	VALU KILLED	AVG EHE	AVG LOST	AVG KILLED
A	B		C	D	E	F	G	H	I	J	K	L
1.	CVA	1	6113	1	2	1.000	16091.	400.000	0.0	16090.703	400.000	0.0
2.	DDG	1	6154	1	0	0.154	322.	6.162	0.0	321.991	6.162	0.0
3.	DD	4	6153	1	0	0.595	858.	11.901	0.0	858.173	11.901	0.0
4.	DD	3	6153	1	2	0.0	0.	0.0	0.0	0.0	0.0	0.0
5.	SSN	1	6321	1	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
6.	DLG	1	6155	1	2	0.802	2005.	32.065	0.0	2004.927	32.065	0.0
7.	DLG	2	6155	1	0	0.716	1786.	28.630	0.0	1785.885	28.630	0.0
8.	SSN	2	6321	1	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
9.	VA	1	6221	1	1	0.0	0.	2.000	150.770	0.0	2.000	150.770
10.	VQ	1	6252	1	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
11.	VF	1	6212	1	1	0.0	0.	0.0	15.000	0.0	0.0	15.000
12.	AEW	1	6242	2	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
13.	AEW	2	6242	3	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
14.	CAP	1	6212	4	1	0.0	0.	0.0	3.000	0.0	0.0	3.000
15.	CAP	2	6212	5	1	0.0	0.	0.0	3.000	0.0	0.0	3.000
16.	CAP	2	6212	5	1	0.0	0.	0.0	0.0	0.0	0.0	0.0

TOTAL BLU VALUE LOST THIS PASS= 480.758 M

TOTAL AVERAGE VALUE LOST IN FIRST 1 PASSES= 480.758

N O

* ** ** ** NEM TEST ** ** ** **

FIGURE IV-15
SUMMARY BY UNITS

CRUISE MISSILE DISPOSITION SUMMARY

Item	Comments
A	Cruise missile type and name.
B	Cruise missiles launched - number launched during allocation.
C	Hits on targets evaluated - number of cruise missiles for which the terminal effects of detonation at the target was computed.
D	Missiles killed enroute - number of cruise missiles intercepted and killed by defense weapon systems.

NOTE: If (C + D) is less than (B), the missing missiles are accounted for by either:

1. Failure to acquire the target ship.
2. Arrived and detonated on a target already dead. (Overkill)

FIGURE IV-15 (Continued)

* ** ** ** NEM TEST ** ** ** **

PGP=NEM. TRAINING. BASELINE ASM RUN= 17 JAN 73 PAGE 82

SEATIDE - NAVAL ENGAGEMENT MODEL - SUMMARY AFTER RANDOMIZED PASS NO.= 1

REC SUMMARY BY UNITS

UNIT	NAME		TYPE	GRUP	STAT	PK	EHE-LBS	VALU LOST	VALU KILLED	AVG EHE	AVG LOST	AVG KILLED
A	B		C	D	E	F	G	H	I	J	K	L
1.	SSC	1	8341	1	1	0.0	0.	0.0	20.594	0.0	0.0	20.594
2.	BGGM	1	8227	2	-1	0.0	0.	0.0	0.0	0.0	0.0	0.0
3.	BGGM	1	8227	2	-1	0.0	0.	0.0	35.123	0.0	0.0	35.123
4.	BGGJ	1	8243	2	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
5.	SSE	1	8343	3	1	0.0	0.	0.0	103.380	0.0	0.0	103.380
6.	SSE	2	8343	3	1	0.0	0.	0.0	107.973	0.0	0.0	107.973
7.	SCJ	1	8241	4	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
8.	BGGM	1	8227	5	-1	0.0	0.	0.0	24.847	0.0	0.0	24.847
9.	BGGM	1	8227	5	-1	0.0	0.	0.0	0.0	0.0	0.0	0.0
10.	BGGM	1	8227	5	-1	0.0	0.	0.0	14.428	0.0	0.0	14.428
11.	BGGM	1	8227	5	-1	0.0	0.	0.0	6.232	0.0	0.0	6.232
12.	BGGJ	1	8243	5	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
13.	KYM	1	8135	6	0	0.604	4626.	48.291	15.543	4626.223	48.291	15.543
14.	KPM	1	8137	6	0	0.992	9803.	79.363	2.000	9803.023	79.363	2.000
15.	KAM	1	8154	6	0	0.578	1501.	23.116	0.0	1501.314	23.116	0.0
16.	BGGM	1	8227	7	-1	0.0	0.	0.0	61.951	0.0	0.0	61.951
17.	BGGM	1	8227	7	-1	0.0	0.	0.0	27.312	0.0	0.0	27.312
18.	BGGM	1	8227	7	-1	0.0	0.	0.0	0.0	0.0	0.0	0.0
19.	BGGM	1	8227	7	-1	0.0	0.	0.0	36.171	0.0	0.0	36.171
20.	BGGJ	1	8243	7	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
21.	BGGM	1	8227	8	-1	0.0	0.	0.0	2.047	0.0	0.0	2.047
22.	BGGM	1	8227	8	-1	0.0	0.	0.0	4.401	0.0	0.0	4.401
23.	BGGM	1	8227	8	-1	0.0	0.	0.0	6.844	0.0	0.0	6.844
24.	BGGM	1	8227	9	-1	0.0	0.	0.0	11.765	0.0	0.0	11.765
25.	BGGJ	1	8243	8	1	0.0	0.	0.0	0.0	0.0	0.0	0.0
26.	BGGM	1	8227	9	-1	0.0	0.	0.0	0.000	0.0	0.0	0.000
27.	BGGM	1	8227	9	-1	0.0	0.	0.0	0.009	0.0	0.0	0.009
28.	BGGM	1	8227	9	-1	0.0	0.	0.0	0.002	0.0	0.0	0.002
29.	BGGM	1	8227	9	-1	0.0	0.	0.0	0.135	0.0	0.0	0.135
30.	BGGJ	1	8243	9	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
31.	RED	2	8242	10	0	0.0	0.	3.000	0.0	0.0	3.000	0.0
32.	RED	6	8242	11	0	0.0	0.	3.000	0.0	0.0	3.000	0.0

TOTAL RED VALUE LOST THIS PASS= 171.770 **M**

TOTAL AVERAGE VALUE LOST IN FIRST 1 PASSES= 171.770

N **O**

* ** ** ** NEM TEST ** ** ** **

* ** ** ** NEM=S728HIGH TEST ** ** ** **

NEM ENGAG.47405.(SY4,MED=1-CV,1-CG,2-KNEAR,4-BG) A6=70, V3=1728. H=81 1-27-75 PAGE 115

		CRUISE MISSILES LAUNCHED	HITS ON TARGETS EVALUATED	MISSILES KILLED ENROUTE
A	A	B	C	D
AS - 6	S816CCCO	32	24	6

* ** ** ** NEM=S728HIGH TEST ** ** ** **

FIGURE IV-16

DYNAMIC STORAGE USAGE

(U) After the last randomized pass, the NEM prints out the NAMELIST &DIMENS previously shown in Figure IV-10. However, some of the variables now show new values which reveal the sizes needed by the model in this particular engagement. This information could be used in planning future runs. Only those of interest are repeated here:

Item	Comment
NYSPU	The average number of subsystems per unit. Affects use of dynamic storage. Default = 10. (See III.3.2)
MAXRTU	Max number of RED units ever on temporary (intercept) trajectories at any one time (See III.3.2).
MAXBTU	Same as MAXRTU, expect for BLU units.
LDIMEN	Max number of 4-Byte words used of that programmed in for dynamic storage.
KSAVE	The reduction in core size (REGION) that could be made for this engagement if desired. (Requires recompilation)

FIGURE IV-16
DYNAMIC STORAGE USAGE

```
              *        **        **       **     NEM   TEST      **        **        **        **

      PGM=AEM, TRAINING, BASELINE ASM                              RUN= 17 JAN 73      PAGE  83

 &CIMENS
 LENSEG=           8,NSEGPL=          8,NSYSPU=          8,MAXRTU=          39,MAXBTU=          22,LDIMEN=        4632,KSAVE=          41,
 NPHASE=           6
 &END

      ZIP 10 0 0          C     0     0     0     0 STOP
                    1                 0           136           133
```


(Reverse side blank)

SECTION V

APPLICATIONS

(U) The purpose of this section is to describe certain applications of the NEM and define some special capabilities not mentioned elsewhere.

1. DATA CHECKS

1.1 Route Checks

(U) The pre-planned routes which are a part of the Engagement structure are defined in Appendix A, Volume IIB. Formats for their inputs are given in Figure III-7. Before investing in an extensive set of NEM computer runs, the User may elect to check his own planning and/or keypunch inputs. This may be done by a special short NEM run as shown in Figure V-1 and discussed as follows.

a. Load or update any Basic Tables as described in Section III.2.5.

b. In the same computer run as "a" above, or separate run (as desired), set up the engagement with a ZIP-8-0-1 card.

c. Read input and call for ROUTE CHECK with a ZIP-6-1-2 card and inputs as follows.

d. Namelist &NUCHEK

   (1) NTIMES. The number of snapshots desired. Maximum = 10.

   (2) TIMES. Battle time (hours) when snapshots are desired.

e. End the run with a ZIP-10 card.

(U) The output will be NTIMES pairs of BLU and RED snapshots in the format of Figure IV-11 of Section IV.

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80 COLUMN CODING AND DATA FORM 0-63797 R1

PROGRAM | ROUTINE | NAME | UNIT | EXT. | DATE | PAGE OF

FIGURE V-1
ROUTE CHECK

TYPE | STATEMENT NO. | CONT. | FORTRAN STATEMENT | FORTRAN | IDENTIFICATION
LOCATION | CONT. | OPERATION | ADDRESS, TAG, DECREMENT | MAP
PAGE SERIAL | A | B | COBOL

```
*         **         **          CLASSIFICATION          **       **      *
PGM=NEM.  RØUTE CHECK.                                        RUN: 15 JAN 74

              { Any Basic Table replacement }
              { or update desired.          }

ZIP 801                             SETUP ENGAGEMENT & SYSTEMS

ZIP 612                             RØUTE CHECK

 &NUCHEK  NTIMES= 10,
          TIMES= -4, -3.5, -3, -2.5, - 2, -1, -.75, -.5, -.25, 0,
 &END

ZIP 10                              STOP

/*             END ØF DATA   END ØF JØB
```

PAGE LINE | LABEL | OPERATION | OPERAND | AUTOCODER | IDENTIFICATION

1.2 Radar Checks

(U) Radars are a part of the systems catalog described in Appendix B, Volume IIB. Formats for the input of their data is given in Figure III-15. Before investing in an extensive set of NEM computer runs, the User may elect to check new input data. This may be done in a special short NEM run for specified radars as shown in Figure V-2 and discussed as follows.

a. Load or update any Basic Tables as described in Section III.2.5.

b. In the same computer run as "a" above, or separate run (as desired), set up the engagement and systems with a ZIP-8-0-1 card.

c. Read input and call for a RADAR CHECK with a ZIP-6-2-1 card and inputs as follows.

d. Namelist &NAM1

(1) IBR. =1, BLU Radar
=2, RED Radar

(2) KTYP. Radar type number

(3) IRNG. Always set to 10.

(4) RANGE. Opening range, NM, from radar to target. Set large to use radar horiz.

(5) RTAR. If IRB=1 (BLU Radar), then use RTAR for RED Target, otherwise reverse them.

RTAR(1) Projected length of target, ft.
RTAR(2) Radar Cross-section, sq. meters
RTAR(3) Target height above sea level, ft.
RTAR(4) Closing velocity, knots

(6) BTAR If IBR=2 (RED Radar), then use BTAR for BLU Target.

(7) BETC BLU Radar Data. Use with IBR=1.
BETC(1) Radar Antenna height, feet
BETC(2) RED jammer stand off range, NM
BETC(3) RED jammer usage.
=0, No Jam
=1, On Board jammer
=2, Stand off jammer

(8) RETC — If IBR=2 (RED Radar), then use RETC

(9) TRAD(1)=0 — Initialize reference time to zero

(10) ISTOP=1, — Use to return to MAIN and read another ZIP card.

(11) RJAM (1) = PJ = Jamming Power, Watts
(2) = GJDB = Jammer Antenna Gain, DB
(3) = BJ = Jammer Bandwidth, Hz
(4) = XLJDB = Jammer Losses, DB
(5) = F1 = Lower Frequency Band Limit, MHz
(6) = F2 = Upper Frequency Band Limit, MHz

(U) The input shown in Figure V-2 calls for testing a BLU radar type 6524 first without and then with jamming. Next it tests a RED radar type 8511 without and then with jamming.

(U) The output has the following form:

a. Namelist repeat of input parameters

b. Formatted (labeled) output of radar data as stored in the systems catalog.

c. Five columns of data for each scan of a search radar, or an arbitrary time interval for track radars. These columns are:

(1) Time, seconds

(2) Slant range, NM

(3) Probability of Detection per "look"

(4) Handoff error (or Track error)

(5) Dynamic range (DB).

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80 COLUMN CODING AND DATA FORM

FIGURE V-2
RADAR CHECK

```
*       **      **              CLASSIFICATION          **        **      *
PGM=NEM.  RADAR CHECK.                                         RUN= 15 JAN 74
          {Any Basic Table replacement or update}
ZIP 801                                    SETUP ENGAGEMENT & SYSTEMS
ZIP 621                                    RADAR CHECK
 $NAM1     IBR= 1,  KTYP= 6524,  IRNG= 10, RANGE= 350.,
        RTAR = 13.7, 1., 24320.,  533.2,
        BETC =   50,100,  0,
 $END
 $NAM1  RJAM =  500,  0, 75.E+6,  1,        RANGE= 350., TRAD(1)= 0,
        BETC =   50,100,  2,                ISTØP= 1,
 $END
ZIP 621                                    RADAR CHECK
 $NAM1     IBR= 2,  KTYP= 8511,  IRNG= 10, RANGE= 350.,
        BTAR = 13.7, 1., 24320.,  533.2,
        RETC =   50,100,  0,
 $END
 $NAM1  BJAM =  500,  0, 75.E+6,  1,        RANGE= 350., TRAD(1)= 0,
        RETC =   50,100,  2,                ISTØP= 1,
 $END
ZIP 10                                     STØP
```

2. TRADE FACTOR DEVELOPMENT

(U) An important application of the NEM is the development of "Trade Factors" for use in the CM-CGSM. These are defined to be partial derivatives of "WORTH" with respect to eleven cruise missile variables as follows.

Number	Cruise Missile Variables
0	Baseline, no variation
1	Accuracy (CEP)
2	Maximum missile range
3	Force size
4	Flight reliability
5	Warhead weight
6	Cruise phase range
7	Low level run in (LLRI) range
8	Cruise phase altitude
9	LLRI altitude
10	Cruise velocity
11	LLRI velocity

(U) WORTH can be defined in terms of any statistic output by the NEM, and increases for desirability from RED point of view. However, it has been set up to use the BLU value lost (BVL) and the RED value lost (RVL), see Figure IV-15. Some suggestions are:

a. WORTH= BVL

b. WORTH= -RVL

c. WORTH= BVL - RVL

d. $$\text{WORTH} = \frac{100 * \text{BVL}}{\text{BVL} + \text{RVL}}$$

Item d. has the merit that WORTH = 50 if the losses are equal, less than 50 if BLU losses are less than RED, and greater than 50 if BLU losses are greater than RED. Also, it minimizes the effect of engagement size.

(U) Not all trade factors are needed by the CGSM at any one time. In fact, there is one option in CGSM in which it needs none at all. In general however, it will be desirable to furnish CGSM with as many good trade factors as are found by experience to be important. The importance of a factor is measured largely by its effect in the NEM.

(U) The development and use of trade factors requires planning. It may be possible to develop a set of general trade

factors good for many applications. But is is expected that in most cases, trade factors will have to be developed in the context of a given application. For example, the trade factors for a submarine launched cruise missile may be significantly different from those for an air launched missile.

2.1 Baseline Runs

(U) A baseline run can be any run in which the engagement structure and naval systems chosen are of interest and from which reasonable variations are intended. It should however contain a sufficient number of the type of missile whose characteristics are to be varied, so that the effects of these variations do not get lost in the "noise".

(U) To establish the baseline, the User may elect to make permanent changes to the NEM data file for the duration of this application as described in Section III.2.5.2, or to set up a small data deck of temporary changes, as described in Section III.2.5.3. These could be used in the baseline run, kept intact as a building block to which variations would be added for each trade factor run. This implies that the trade factor variations should follow the baseline changes and be set up as ZIP-11-2-2 changes in order to update the updates which produced the baseline.

2.2 Variation Runs

(U) For each of the cruise missile variables listed earlier which are chosen for variation, there should be one or two runs in which that item is varied and all others are held constant as given in the baseline. Since not all the variables occur in one place, these are discussed individually.

(1) Accuracy. This is affected by the following entries in Table 9810-2, (Figure III-20).
   a. Col. 7 CEP
   b. Col. 8 BIASM
   c. Col. 9 CØDEM

   For terminal homing systems it is affected by radar characteristics in Table 8710 (Figure III-15).

(2) Max Missile Range. This is affected by the following entries in Table 9810-2.
   a. Col. 1 RNG
   b. Col. 2A TRAJ Code

   Also in Table 4110 (Figure III-10)
   a. Col. 2 RMX

b. Col 5 or 7, R2 or R3 depending upon which is the cruise leg set in Col. 1.

(3) Force Size. A cumulation of numbers of groups, number of units in the group, and number of missiles and launchers per unit. See Tables 0002, 02XX for groups and units and extents -4 and -5 in Tables 8130, 8210, and 8330 for quantities on platforms.

(4) Flight Reliability. See Col. 4 Table 9810 -1.

(5) Warhead Weight. See Col. 3 Table 9810 -1.

(6) } Trajectory. See Table 4110, Figure III-10.
(11) }

(U) Trade factors are then calculated by hand outside the NEM and plotted as delta worth (from a chosen baseline) versus the parameter being varied. These are then entered in the CM-CGSM and used in a table-lookup.

SECTION VI
COMPUTER OPERATIONS PROCEDURES

(U) This section defines the resource requirements and the operations procedures for implementing the Naval Engagement Model on the IBM 360 computer system.

1. SOURCE PROGRAM MAINTENANCE

(U) The model is written in the Fortran IV EBCDIC computer language. It is comprised of 84 subprograms totaling some 10,000 source records. A modular flow chart relating the subprograms is given by Figure VI-1.

(U) The source program is maintained both in the form of card decks and as a listing of the card images on a nine track magnetic tape.

CARD DECKS - 1000 source card records.

MAGNETIC TAPE - One 9-track unlabeled tape with 10,269 source card images.

The DCB parameters for this tape are specified by the JCL in Figure VI-2. Some of these are listed as follows:

9-Track
Unlabeled
Density=2=800 BPI
RECM=FB=Fixed Blocked
LRECL=80
Blocksize=32000
(400 card images per blocked record)

2. LOAD MODULE MAINTENANCE

(U) The IBM cataloged procedure FORTHCL should be used to compile the source program and link-edit the resulting object module to a user's load-module library. The load-module library to be used in DIA applications resides on the RIPTIDE/SEATIDE private disk pack. This disk pack must be mounted for all load-module maintenance runs. The JCL defining the disk pack appears in every job setup illustrated in this section (e.g., Figure VI-2).

(U) An existing load-module may be updated by recompiling the modified subprograms and link-editing these changes to the library. The JCL defining the setup for the job is given in Figure VI-2. Card decks of the modified subprograms would be input to the compiler via the FORT.SYSIN DD* data set.

MODULAR FLOW DIAGRAM RELATING NEM SUBPROGRAMS

Notes:

The blocked listings of the subprograms show the overlay structure of the load-module.

The arrowed flow lines show the major call relationships between the subprograms.

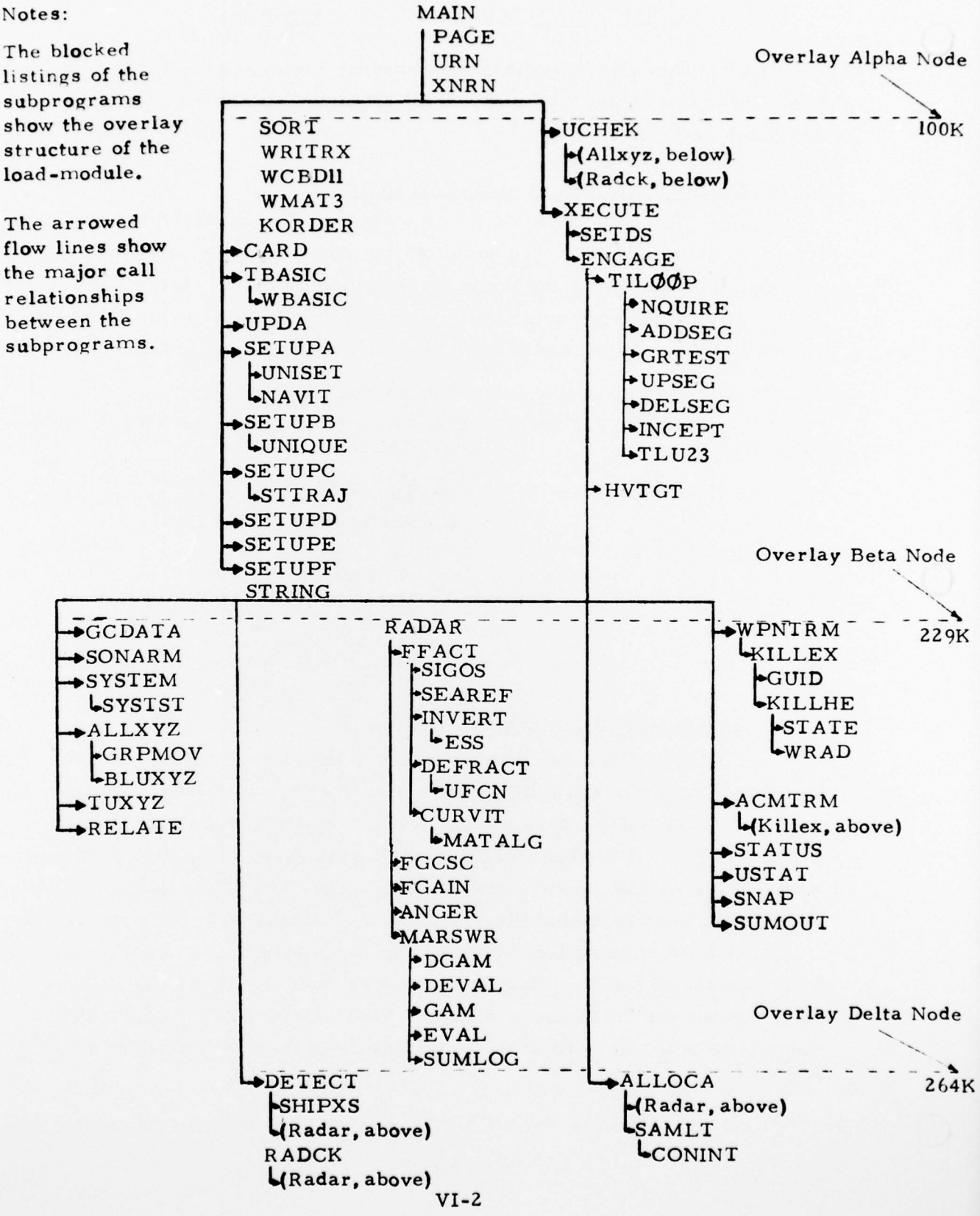

FIGURE VI - 2

NEM COMPILATION AND LINK EDIT TO A USER'S LIBRARY

```
//HJ1003   JOB (0295,5A3B,,,,,,,,65,FC3-0001,UNC,03),                    X
//             RIPTIDE,MSGLEVEL=1,COND=(7,LT)
//COMPLKED EXEC FORTHCL,PARM.FORT='ID,MAP',                              X
//             REGION.FORT=212K,                                         X
//             PARM.LKED='OVLY,LET,MAP,LIST,SIZE=(200K,60K)',            X
//             REGION.LKED=212K
//FORT.SYSLIN DD SPACE=(CYL,(5,1))
//FORT.SYSIN DD *
```

[N.E.M. Fortran Source Decks]

```
/*              END OF FORTRAN SOURCE DECKS
//LKED.SYSLMOD DD DSN=SYS1.DS5CSEAA,UNIT=2314,VOL=SER=RIPTDE,DISP=OLD,   X
//             SPACE=(CYL,(5,5))
//LKED.SYSIN DD *
      INCLUDE SYSLMOD(NEM75JAN)
   OVERLAY ALPHA
      INSERT WCBD11,WMAT3,WRITRX,SORT,KORDER,UNIQUE,CZAZA,CWORK
      INSERT TBASIC,WBASIC,CARD,UPDA,SETUPA,NAVIT,UNISET,SETUPB
      INSERT SETUPC,STTRAJ,SETUPD,SETUPE,SETUPF,STRING
   OVERLAY ALPHA
      INSERT XECUTE,ENGAGE,TILOOP,HVTGT
      INSERT NQUIRE,SETDS,UPSEG,ADDSEG,DELSEG,TLU23
      INSERT GRTEST,INCEPT,UCHEK,BATTRY,ECONST,INFO,EXSTOR,GNAV
      INSERT ETIME,WORK,CTLOOP
   OVERLAY BETA
      INSERT GCDATA,SONARM,SYSTEM,SYSTST,ALLXYZ,GRPMOV,BLUXYZ
      INSERT TUXYZ,RELATE
   OVERLAY BETA
      INSERT RADAR,FFACT,MARSWR,DGAM,DEVAL,GAM,EVAL,SUMLOG,INVERT
      INSERT ESS,SEAREF,DFRACT,UFCN,CURVIT,MATALG,ANGER,FGCSC,FGAIN
      INSERT SIGOS,BLK1,BLK2,BLK3,BLKO
   OVERLAY DELTA
      INSERT DETECT,SHIPXS,RADCK
   OVERLAY DELTA
      INSERT ALLOCA,SAMLT,CONINT
   OVERLAY BETA
      INSERT WPNTRM,ACMTRM,KILLEX,KILLHE,STATE,WRAD,TLU23,GUID,CGUID
      INSERT STATUS,USTAT,SNAP,SUMOUT
   ENTRY MAIN
   NAME NEM75JAN(R)
/*
```

alternate JCL used for tape input to the compiler.

```
//FORT.SYSIN DD DSN=NEM01,UNIT=SYST9,VOL=SER=005064,                     X
//             DCB=(DEN=2,BUFNO=1,RECFM=FB,LRECL=80,BLKSIZE=32000),      X
//             DISP=(OLD,KEEP),LABEL=(,BLP)
```

(U) If the entire source program is to be compiled, the source tape may be input to the compiler. This eliminates handling the large number of source cards. The alternate JCL required for this option is also given in Figure VI-2. Compiling the total program requires about 12 minutes of CPU time and generates about 13000 lines of output.

(U) Considerations with respect to the input data set (LKED.SYSIN) for the linkage-editor are as follows:

a. The first card shown (INCLUDE . . .) must always be used when updating an existing load-module. This card is omitted when the entire source program is compiled.

b. The inputs to the linkage-editor that define the overlay structure for the load-module are the OVERLAY and INSERT cards shown in Figure VI-2.

c. The ENTRY MAIN card follows the overlay cards and is always required.

d. The NAME . . . . .(R) card must be last. This card defines the name that will be used to reference the load-module for execution or update in later runs.

2.1 Library Maintenance

(U) Whenever a load-module is updated, the new version is written in a new location on the library. The storage taken up by the old version is not automatically released. The library should be compressed periodically to free the storage held by obsolete load-modules. The JCL and the utility program that execute this operation are given in Figure VI-3.

3. LOAD MODULE EXECUTION

(U) Figure VI-4 gives the JCL required to execute the model at run time. The program is assumed to be in load-module form on the user's library. At the DIA facility, the RIPTIDE/SEATIDE private disk pack must be mounted to provide access to this job library. The only other input required is the JCL and the data cards submitted with the job.

(U) The "EXEC . . ." card specifies the name of the load-module to be executed, the core requirements (264K), and the maximum CPU run time (60 minutes).

(U) The files required by the job are either scratch SYSDA ter. porary storage files or refer to permanent storage files on the RIPTIDE/SEATIDE disk pack. No tape volumes are required. No operator intervention is required.

FT09F001 - Temporary sequential SYSDA scratch file used for the storage/retrieval of all input data cards read.

FT11F001 - Permanent direct access data set created on the disk pack for storage of NEM basic table data.

FT05F001 - Standard Fortran card input data set.

FT06F001 - Standard Fortran printer output data set.

FT07F001 - Standard Fortran card punch data set.

FT08F001 - Tape or Sequential Disk File for Input Data.

FIGURE VI - 3

LIBRARY COMPRESS UTILITY JCL

```
//HJ0003    JOB (0295,5A3B,,,,,,,65,F03-0001,UNC,03),                    X
//      .         RIPTDE,MSGLEVEL=1
//COPYPDS  EXEC PGM=IEBCOPY,REGION=200K
//SYSPRINT DD SYSOUT=A
//RIA DD DSN=SYS1.DS5CSEAA,UNIT=2314,VOL=SER=RIPTDE,DISP=OLD
//SYSIN DD *
 COPY OUTDD=RIA,INDD=RIA
/*              END OF DATA   END OF JOB
```

FIGURE VI - 4

NEM LOAD MODULE EXECUTION JCL

```
//HJ0003   JOB (0295,5A3B,,,,,,,65,F03-0001,UNC,03),                    X
//             RIPTIDE,MSGLEVEL=1,COND=(7,LT)
//JOBLIB  DD DSN=SYS1.DS5CSEAA,UNIT=2314,VOL=SER=RIPTDE,DISP=(SHR,PASS)
//NEM      EXEC PGM=NEM001,REGION=264K,TIME=60
//SYSUDUMP DD  SYSOUT=A
//FT09F001     DD DSN=&&LG09,UNIT=SYSDA,DISP=(NEW,PASS),               X
//             DCB=(,BUFNO=2,RECFM=FB,LRECL=80,BLKSIZE=1600),          X
//             SPACE=(CYL,(2,1))
//FT08F001     DD DUMMY
//FT11F001    DD DSN=SCIK.SEA11,UNIT=2314,VOL=SER=RIPTDE,              X
//             DCB=(,BUFNO=2,DSORG=DA,OPTCD=C,RECFM=FT),               X
//             SPACE=(CYL,(5,1)),DISP=(OLD,KEEP)
//FT06F001 DD  SYSOUT=A
//FT07F001 DD  SYSOUT=B
//FT05F001 DD  *
```

{ N.E.M. Data Decks }

```
/*             END OF DATA   END OF JOB
```

Note: If a data tape is being used (see ZIP 12), substitute the following for the dummy file FT08F001 above.

```
//FT08F001     DD DSN=SCIK.NEMDAT00,UNIT=SYST9,VOL=SER=003081,        x
//             DCB=(DEN=2,RECFM=F,LRECL=80,BLKSIZE=80),               x
//             DISP=(OLD,KEEP),LABEL=(,BLP)   NEM BASIC TABLES
```


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SECTION VII

SAMPLE PROBLEM

(U) Since the sample problem contains secret data it is bound separately as Addendum I to Volume IIA, NEM Users Manual.

(U) Addendum I contains the card images of all Basic Tables placed permanently on the SEATIDE disk pack under DSNAME = SCIK.SEA11. The access to this file is described in Section VI (Computer Operations Procedures) under FORTRAN File 11, with DEFINE FILE 11 (180, 555, U, JD11) in the MAIN program of the FORTRAN Source which is listed in Volume IID.

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